

September 2002 Draft Stormwater Management Manual for Eastern Washington

Summary of Public Comments
December 18, 2002

All of the public comments on the draft manual are grouped by source, in the order in which they were received, under each of the following topics:

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To view the entire set comments from any source, please download the corresponding numbered document from the E WA Stormwater Project ftp site* or contact David Moss at 509.744.9271 or David.Moss@tetrattech.com

*The ftp site is <ftp://ewstormwater@12.129.210.51/> if you are using Internet Explorer; if you are using a different browser, the site is: <ftp://12.129.210.51> and the UserID is: ewstormwater; there is no password.

General Comments on the Manual

Public Workshops:

1. Review the manual every 3 years
2. Teach college stormwater engineering courses
3. Need to allow practical and flexible plan review
4. E WA needs a manual; good start
5. Concerns about cost to local government for enforcement
6. Concerns about cost versus benefit of other environmental work in E WA
7. Concerns about cost of monitoring; credibility of samples and analyses
8. Manual is a guideline

29 Cheryl Morgan:

1. Concerns about local (Pullman area) flooding problems and potential of manual to address them

30 Yakima Co:

1. Information about how the Manual affects development should be easily identifiable to reader.
2. Manual treats all projects the same, with the exception of thresholds. The complexity of developing a stormwater control plan is beyond the ability of smaller project developers and makes it difficult to comply with the requirements, while small projects are less likely to need intensive controls. Some method should be considered and recommended for streamlining or simplifying the process for smaller but non-exempt development in situations where there are few specific stormwater concerns. This might include recommendations for “canned” stormwater plans that can be easily modified for small projects that meet given conditions.

33 Spokane Co:

1. Every mention of “discharge to surface waters or water bodies” etc. should be revised to read “discharge to waters of the State.” The manual needs a clear definition of “waters of the state” and of the bodies of surface water considered to be “waters of the state.”
2. This manual alone has no authority to prohibit uses.

34 USPS:

1. The USPS understands that the Manual is not a regulation nor does it have independent regulatory authority. However, regulations can cite this Manual and its BMPs, Core Elements, etc. as the means to compliance. It is expected that the UIC Rule Revision will cite relevant portions of the Manual as the means to compliance or criteria for rule authorization of Class V wells. It is thus difficult to provide specific comments with respect to portions of the Manual that may or may not “in essence” become regulation via references in the still undefined UIC Rule Revision. The USPS believes this uncertainty also complicates the Manual’s goal of supporting sound public health and environmental policy related to stormwater.
2. Manual should encourage activities that support infiltration options and encourage the development of new storm water management practices.
3. The Manual should not limit options of continued injection but instead rely on the ongoing revision to UICP rules and its definition of Authorized by Rule (with that definition’s inherent impacts to non-endangerment).

4. The Manual authors should distribute and incorporate results of pilot studies attempting to demonstrate the sufficiency of natural available attenuation (treatment) of dry wells. (Spokane City study of dry wells.)
5. Will the Manual be subject to revisions once the final UIC Rule revisions are cast?
6. Has the state completed a classification of Aquifer Susceptibility? If so where can it be viewed?
7. Who or what is eligible for being classified as a municipality?

37 Ecology:

1. Ecology would like to reiterate for the members of the Steering Committee and both Subcommittees how we anticipate that the Model Program and the Manual will be used by local jurisdictions, and how they relate to the future Phase II Municipal Stormwater permit. The purpose of developing all three documents is to protect local water quality. Each jurisdiction and most project proponents will, appropriately, select different combinations of practices to employ in order to meet this objective. Although no decision has yet been made as to what the Phase II permit for eastern Washington jurisdictions will require, our expectation is that the permit will draw from the Model Program and the permit applications to establish appropriate requirements. At this point, we do not expect that the Phase II permit will require eastern Washington jurisdictions to fully implement all aspects of the Model Program. It is Ecology's expectation that the on-site stormwater management practices in the Manual represent an acceptable standard for protecting water quality. The requirement that a project proponent follow certain practices will come from a permit or other regulatory program; the Manual provides technical guidance on how to comply with that requirement.
2. The eastern and western Washington Manuals appropriately have many common elements as well as contrasting approaches to on-site stormwater management. Because both of the Manuals will be used by many project proponents and by agency staff, it would be helpful to provide a summary comparison of the two manuals in the foreword or in the introductory chapter of the eastern Washington Manual. Such a section should be included in revisions and updates to the western Washington Manual as well. It is essential from Ecology's perspective that the differences in the two Manuals be technically supportable, *e.g.* based on differences in climate, hydrology, geology, and other available scientific information that merits changing approaches to managing stormwater – and not stem from divergent policy decisions.

38 Ten Cities:

1. Throughout the document, there are statements that the requirement(s) “does not excuse any discharge from the obligation to apply whatever technology is necessary to comply with State Water Quality Standards”. We suggest substituting “as not to cause a violation of” for “to comply with”. This change clarifies that the discharge itself need not meet water quality standards but that the discharge will not cause a violation.
2. The Manual is not very user friendly (Ch. 4, 5, 6). Most of the design/regulatory information is buried in the text. It would be helpful if the design parameters were placed in tabular form with flow charts provided for various projects types.

39 City of Spokane:

1. We have concerns that until regulation has been written to address UIC, our comments concerning those parts of this document may not be complete. We are getting mixed

signals locally from Ecology on the future validity of drywells and whether or not they will be rule authorized. City involvement in the regulatory process for UIC is a must.

2. Existing platted projects should have additional exemptions from this manual (we may wish to be more specific).

40 WSDOT:

1. In addition to our specific comments, we included copies of the relevant work that has been generated from our Department's Highway Runoff Manual (HRM) revision effort. An interdisciplinary technical and policy team is guiding the revision, made up of headquarters and region offices, as well as a few local agencies.
2. The HRM revision is using as its foundation the ten minimum requirements from Ecology's recently published Stormwater Management Manual for Western Washington (SMMWW) as well as building from the existing 1995 HRM. Analyses were prepared to outline how the SMMWW minimum requirements can be met in ways that make sense in a highway setting and are good for the aquatic environment. From these assessments, policy discussion papers were developed that are being used to initiate our collaborative effort to resolve issues and develop solutions with Ecology.

Chapter 1 Introduction

30 Yakima Co:

1. Manual becomes a regulation through NPDES permit. Should be clearly stated.
2. Why discuss research in Puget Sound? What is applicability to E WA? Present research and problems identified in arid lands.
3. Differences between Phase I and Phase II requirements should be summarized; compare Core Elements and thresholds for Phase I and Phase II
4. Include a summary table of how manual affects development types and land uses; areas to address (Core Elements)

32 Wenatchee UA:

1. p. 1-6 Stormwater pollution data for Washington should be reported. See UW and WSU studies of highway runoff.

33 Spokane Co:

1. Page FOR-1, 2nd paragraph, first sentence: Replace with the following: "The objective of this Manual is to provide guidance in stormwater design and management. The Manual aims to present a commonly accepted set of technical standards, in addition to presenting new design information and new approaches to stormwater management."
2. The Manual explains in depth the background behind the requirements. However, it also needs to provide the users the tools to design a project that complies with the Manual. This document needs to specifically provide concise steps that achieve the goals put forth in this Manual.
3. This Manual covers several State and Federal permits, but also tries to provide general guidance for stormwater design in Eastern Washington. Ecology needs to clarify in the Manual the expected roles of local jurisdictions in implementing and enforcing these other permits and programs such as the Industrial permit and UIC program.
4. Section 1.1 Purpose and Scope, Page 1-1, 2nd paragraph, first sentence: Replace with the following: "The objective of this Manual is to provide guidance in stormwater design and management. The Manual aims to present a commonly accepted set of technical

standards, in addition to presenting new design information and new approaches to stormwater management.”

5. Section 1.3.3 Construction Stormwater General Permit, 1st paragraph, Page 1-9: Expand sentence after “...and/or storm drain” to “...and/or public storm drain system used to carry surface and stormwater from surrounding lands to streams and lakes.” This is the Glossary definition of a ‘storm drain system.’
6. Section 1.4.1 Best Management Practices, 3rd paragraph, Page 1-13: Change Item (3) from, “through reduction of discharge flow rates” to “through the discharge of flow rates that best mimic those which naturally occur.” This change reflects Ecology’s comments at the Manual Subcommittee Meetings regarding Ecology’s goal with respect to protection of stream channels from erosion.
7. Section 1.4.2 Source Control BMPs, 2nd paragraph, Page 1-13: Source Control is not more cost effective because the agency or developer is required to “pay” twice: once when implementing Source Control and again when required to provide stormwater treatment. No “credit” is given in this manual for source control. The same amount of runoff treatment is still required in Core Element No. 5. Either this paragraph should be deleted, or it should be reworded so as to encourage Source Control prior a problem occurring. In either case, Source Control should not be noted as cost-effective, unless it specified that it is cost-effective to the community at-large, rather than the designer/developer implementing the design requirements.
8. Another possibility is to allow a credit for utilizing Source Control. Since it is assumed that Source Control lessens the potential impact of pollutants entering runoff, then the Manual could propose a reduction in treatment requirements when Source Controls are implemented – this could be considered cost effective versus being required to do both.
9. Section 1.4.4 Flow Control BMPs, 7th paragraph, 2nd to the last sentence, Page 1-15:
10. Replace this sentence with, “Accurate estimates of what should be done to maintain the natural hydroperiod may require data collection prior to the development activity and the use of a continuous runoff model.” This eliminates the end of the original sentence.
11. Section 1.4.5 New and Emerging BMPs, 1st paragraph, first sentence, Page 1-15: Change the word “managing stormwater” to “treating stormwater.”
12. After Section 1.4.5, Page 1-16: Add a new subsection entitled: 1.4.6 New Design Approaches. The intent of this section is to describe the methodology to review the new design approaches.
13. After Section 1.4.5, Page 1-16: Add the following paragraph after this new subheading: Ecology recognizes that technology, software, philosophies and methodologies related to stormwater design and management are ever-evolving and will undoubtedly continue to change with time. Since this Manual is intended to be a living document, a process has been developed to aid local jurisdictions in their pursuit to propose new design ideas with respect to stormwater design and management. More information can be found in Chapter 4, Section 4.8, regarding this process, including Ecology’s role in the concept, review and approval of new design approaches.
14. Section 1.5.2 Alternative Technical Manuals, Page 1-17: Last sentence: Local jurisdictions are “directed” to adopt this Manual while they develop a local “equivalent” manual. We request that Ecology allow us to use our current manual for a period of time (a grace period of two years, for example) from the date of adoption of the Eastern Washington Manual while we revise our existing drainage standards.

34 USPS:

1. The USPS suggests adding an explanation/example for using the Demonstration Approach and the expected timeline of using the demonstration approach for achieving compliance.

36 ACEC Spokane:

1. Chapter 1 is weak on showing a local jurisdiction an approach that could be taken if an engineer or developer sponsors a methodology that differs from the manual.
2. Chapter is weak in clear definitions for various regulatory standards.

38 Ten Cities:

1. p. 1-10 Will the Manual be changed to reflect the actual revisions to the UIC Rule? Since the UIC Rule revision will be finalized after the Stormwater Management Manual is adopted, the Manual should refer to future UIC changes or be revised after the UIC Rule Making is complete.

39 City of Spokane:

1. Under Objective of Manual, second paragraph, revise to read "... water quality standards and protect beneficial uses of the receiving waters and groundwater" since we have included a portion of the manual addressing susceptibility issues, drywells, etc.
2. 1.3.4, last sentence, remove the reference to catch basins or define better. If the intent is to leave in, redefine separate item as seepage catch basin.
3. Table 1B see the attached flow chart (separate document) that may help clarify the redevelopment status. This should be included in addition to Table 1B

40 WSDOT:

1. Page 1-3: In *Figure 1.A* under hydrology, the last bullet states, "transportation infrastructure represents between 50% and 75% of the impervious surface area within any single watershed". How are these percentages derived? They seem high for a watershed scale, particularly watershed in a rural setting.
2. The statement that "about one house per five acres" causes adverse impacts in Eastern Washington has no scientific basis for the vast majority of eastern Washington. Its inclusion fosters the perception of imposing western Washington conditions and regulations on eastern Washington. This may be true of directly connected impervious areas, but that is not the norm in eastern Washington.
3. Page 1-8: *Section 1.3*. As an agency of state government, WSDOT is responsible and obligated to comply with federal and state regulation and to those federal and state regulations that are passed down to local jurisdictions. This section may be interpreted by manual users and local jurisdictions that WSDOT is subject to local government requirements, but it has been ruled that WSDOT is not subject to ordinances and rules established by local governments.
4. Page 1-16: *Section 1-5*. We concur and agree with the statement that "The Manual itself has no independent regulatory authority." We support the understanding that this manual is not a regulation, but a guidance document that provides general and industry accepted set of technical standards for stormwater management that should, if applied, protect water quality. WSDOT has been practicing and leading stormwater management for numerous years through the NPDES permit process both individually and generally during construction; developing the statewide construction erosion and sediment control program and certification; and through other federal and state permits and approvals. WSDOT has also developed and gotten approval on its own *Highway Runoff Manual*.

This manual is currently going through a rewrite and update so that it can continue to be considered as an “equivalent” manual by Ecology for both Western and Eastern Washington.

5. Page 1-11: Will this manual be reviewed and approved by NMFS and USFW for ESA compliance?

Glossary

32 Wenatchee UA:

1. add gravel parking lots to the list in the definition of “impervious surface”
2. add a definition of commercial development

33 Spokane Co:

1. Page GLO-2, definition of “Arterial”: Insert the word “public” between “A” and “road,” as private roads do not follow the same road classifications as public.
2. Page GLO-9, definition of “Ineffective impervious surface”: Replace the word “pavement” with “surface” to account for other types of impervious surfaces that could meet this criteria; the roof of a house, for example.
3. Page GLO-9, definition of “Intermittent stream or intermittent channel”: Add the following sentence at the end of the definition: Intermittent streams/channels are not considered waters of the State.
4. Page GLO-15, definition of “Pollution-generating impervious surface (PGIS)”: Remove “unvegetated road shoulders” from the PGIS list and move it to the list of surfaces that are not considered PGIS; there is not enough traffic on road shoulders to require runoff treatment of this area; Change this definition to match the definition of PGIS on p. 2-17.
5. Page GLO-15, definition of “Predeveloped condition”: This definition will be difficult to implement and enforce: There is no way to know what conditions existed at a site “prior to the influence of Euro-American settlement.” Noting that the definition of “Existing Condition” is reserved for a site that has experienced some level of development, replace the definition of “Predeveloped Condition” in the Draft Manual with the following: The historical land use associated with the site prior to any land disturbance that is inconsistent with the established historical site characteristics. An example would be a site which was sparsely wooded with fairly dense underbrush and has recently (in the past few weeks, months or years) been logged, cleared and/or graded in anticipation of development or a change in land use: this site’s pre-developed condition would be forest/woods with a dense undercover. Another example would be acreage that has been historically been farmed for agricultural use, such as alfalfa, and the farmer/owner has let the acreage go fallow either in anticipation of development or a change in land use: the pre-developed condition for this site would be the crop that was grown most recently or grown the longest historically.
6. Page GLO-20, definition of “Swale”: Replace the definition in the Draft Manual with the following: A constructed, shallow grassy drainage depression or conveyance with relatively gentle sideslopes that typically has an overall storage depth or flow depth of one foot or less.
7. Page GLO-22, definition of “waters of the State”: Revise this definition to read: State waters include lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, seasonal and perennial streams, and all other surface waters within the jurisdiction of the state of Washington. Intermittent streams/channels are not considered

waters of the State. The word “watercourses” is too broad and it is important to tie the appropriate stream types to “waters of the State.”

34 USPS:

1. What is the definition of commercial as used within the Manual?
2. We need definitions for the terms “handle,” “potential” and “hazardous substances” as used on page 2-18: handle hazardous substances and the potential to reach the subsurface.
3. The Manual should also define non-contaminant generating roofs

39 City of Spokane:

1. The glossary would be more appropriately placed at the end of the document versus within Chapter 1
2. Add the following terms to the Glossary: "Local Jurisdiction," "Administrator" and "Permitting Authority"
3. 4.5.3 Curve Number - NRCS definition should be placed in the glossary under NRCS with reference to SCS.
4. 6.2.2 Annual Rainfall - Is the use of arid and semi-arid consistent with the rainfall levels that we are talking about? Arid being up to 16 inches and semi-arid to 35 inches. If not, either change or discuss the definition in the glossary regarding the use of these terms in this manual.

40 WSDOT:

1. Page GLO-5: Effective impervious areas. The statement that “Most impervious areas are effective” is not true in eastern Washington.

Chapter 2 Core Elements: *See general comments immediately below and also specific comments related to redevelopment (commercial/ industrial and roads), design storms, snowmelt factors, and Core Elements 1-8 further below*

General Comments on Ch. 2

30 Yakima Co:

1. Difficult to find how manual applies to different developments and land uses.

32 Wenatchee UA:

1. Table 2.A, page 2-2: For total impervious surface < 10,000 and PGIS < 5,000 SF, Core Element #1 should be “Yes” with a foot note excluding single family residential homes. Core element #1 is necessary in order for local agencies to review core elements #2, #3, #4, and #8.
2. Figure 2.A, page 2-3: Core element #2 should be required on the left side of the flow chart where the answers to the questions are “No”. As written, this flow chart is not consistent with Table 2.A.
3. Figure 2.A, page 2-3: Define light, moderate, and heavy pollutant loading sources in the glossary or clarify the location of discussion in Chapter 6.
4. 2.1.2, page 2-5: Core element #1 is necessary to demonstrate how the other core elements are implemented.
5. 2.1.4, page 2-9: This section needs revising to specify the criteria needed to allow a local exception or variance to the regulations rather than describing the process of publication and written finding of fact. This section should state that the process for providing a variance is to be established by local ordinance. Also, include that it is the proponent’s

responsibility to provide all information necessary for the local agency to make a determination on the variance.

33 Spokane Co:

1. The Manual needs to mention the NPDES Phase II Federal threshold of one acre for project compliance.
2. Section 2.1 Introduction, 1st paragraph, second sentence, Page 2-1: Replace the phrase "...that discharge to surface waters or..." with "that discharge to waters of the state or..." This will prompt the reader to look up and read the definition of 'waters of the State', which will include lakes, streams, etc. The second sentence states that the core elements are applicable to discharges to surface waters and (the draft manual says "or") to UIC rule-authorized subsurface infiltration systems. Recommend this be noted in the title for Table 2.A and then remove footnotes 1 & 2 at the bottom of the page since these are redundant.
3. Table 2.A, Page 2-2: In the header, insert "that disturb more than 1 acre" after the word 'projects.' Suggest removing the words "use in" from the title of Table 2.A. The first "No" on the table should be "Yes" because in order to demonstrate that the required Core Elements have been satisfied (i.e. Source Control BMPs, for example), a Stormwater Site Plan must be a part of the submittal package. The first "No," under Core Element No. 7, should be "Yes" because many of the Source Control BMPs will require regular maintenance. The two boxes under Runoff Treatment that indicate "Yes" should be footnoted to reflect the criteria outlined in the two bullets on Page 2-17 (Section 2.2.5, Guidelines); the "Yes" alone implies that it is always "Yes," whereas the text on Page 2-17 indicates otherwise. How does this table apply to discharge to surface waters? If it is intended specifically for UIC regulation, then the header should state that. If not, then this table's application to discharge to waters of the State should be clearly stated.
4. Figure 2.A, Page 2-3: In the italicized statement below the heading, replace the first sentence with, "Guidance is provided in Chapter 6 of this Manual for determining pollutant loading source and aquifer susceptibility classifications." The remainder of the sentence is unnecessary and was already deleted from Core Element No. 5. In the italicized statement below the heading, remove the second sentence, "All projects should consider implementation of Core Element No. 2," as it is inconsistent with Table 2.A on page 2-2 which indicates that all projects require Core Element No. 2. Core Element No. 2 should be included in the boxes on the flow chart where applicable.
5. Section 2.1.1 Exemptions, Page 2-4: Change 'Non-exempt practices' to its own Section (Section 2.1.2, for example). If the reader was looking for what practices were non-exempt, they would not expect to find them under 'Exemptions.' The first bullet under 'Non-exempt practices' is actually worded as an 'Exemption;' move the first two sentences up to 'Exemptions'. Modify the last sentence to say "If impervious surfaces are expanded, and they meet the surface area thresholds, the new surfaces are subject to all of the Core Elements." In addition, the Manual states that if you cannot hydraulically separate the new surface from the old surface, then the entire surface must be treated. To be consistent, this should be restated here.
6. Section 2.1.2 New Development, Page 2-5: Core Element No. 1 should be a requirement; how can Core Element No 4, Preservation of Natural Drainage Systems and Outfalls be shown without a Site/Drainage Plan?

7. Section 2.1.4 Local Exceptions/Variations, Page 2-9: Remove the first bullet, as it is too broad. Who is the implied “permitting authority” in the first sentence of the paragraph below the three bullets? Is it Ecology or the local jurisdiction? Remove the word ‘generally’ from the second sentence in the paragraph below the three bullets; leaving it in takes away the ability of a local jurisdiction to grant a deviation based upon site-specific criteria.

34 USPS:

1. Concern is avoiding Manual-created impacts to existing infiltration and injection systems
2. We suggest that the Manual consider exemptions for projects enhancing the performance of existing infiltration and injection systems similar as those included for road and parking area maintenance (2.1.1) If the project’s change to runoff characteristics is positive (improves the runoff (less pollutants)) then exempt the activity. Consider adding language that goes beyond replacements as defined in 2.1.1 to include “improvement in runoff characteristics”. This suggestion seems consistent with Section 2.1.4 Local Exceptions/Variations
3. Do the core elements apply even if the UIC system is pre-existing and not part of a “project”? (Page 2-1)
4. Do the Core Elements apply only for dry wells associated with project activity meeting identified thresholds?
5. If the core elements are required by a project – is there a submittal requirement for prepared documents and plans? If so, can the applicable reporting process be outlined in the Manual?
6. The manual contains a local regulatory fee approach to avoid constructing treatment facilities. We encourage the inclusion of this option and the associated flexibility it provides local communities.

36 ACEC Spokane:

1. Page 2-3: The actions after step should include a reference to Core Requirement #2, and should be coordinated with Table 2.A
2. Table 2.A: how is CR #4 met without showing how on a plan (CR#1)?
3. Page 2-9, section 2.1.4: Need to define “permitting authority”

38 Ten Cities:

1. p. 2-2 What is the basis for utilizing the 5,000-sf/10,000-sf thresholds for determining the applicability of Core Elements? A justification or reference and a discussion of applicability to eastern Washington should be provided.
2. p. 2-5 Cost must be considered in all decision making since it is inefficient to spend endless money to solve problems that have little impact. Both cost and potential impacts (change in characteristics) should be equally considered in determining what type of project should be regulated.
3. Limited research at construction sites has established an average dust emission rate of 1.2 tons/acre/month for active construction (Stormwater Management Manual for the Puget Sound Basin, WA Dept. of Ecology, 1992). Given the drier climate and more prevalent wind in E WA, dust control should be considered a potential major source of pollutants.
4. The text states that “metal roofs are also considered to be PGIS unless coated with an inert, non-leachable material”. We suggest substituting “so that leaching of metals from the roof will not occur”. This change avoids problems with the definition of “inert” and

addresses the fact that all coatings may leach some chemical albeit at very low concentrations.

39 City of Spokane:

1. Existing platted projects should have additional exemptions from this manual (we may wish to be more specific).
2. See the attached flow chart which should be added in addition to Table 1.B.
3. We have had considerable discussion of the following issues with no proposed remedies:
 - a) There are still numerous types of redevelopment, which may be interpreted in different ways such as binding site plans and redevelopment of large sites in stages where the first improvements may not kick in requirements, but the adjacent subsequent business improvement may. There may be issues of equity. It's my understanding that we are not proposing changes to this section based on the reference to project limits, which may give us the latitude we need.
 - b) There was also a general concern that the Supplemental and Local Exemptions may not stand up to third party lawsuits. No specific changes are proposed at this time.
 - c) There is some concern as to how we should treat asphaltic roofs. The glossary is unclear whether this is included in PGIS or not. Also, we are hearing that if an asphaltic roof is flushed several times capturing the runoff, that the discharge could then be directly to ground or surface water. Where does Ecology stand on this?
 - d) The supplemental guidelines might be more fitting if moved to the appendix. We would have to look at whether all the issues could be covered in a central location.
4. Consider subdividing a section called Local Options or Local Jurisdiction Guidance. This could be included with the supplemental guidelines in the appendix. We don't disagree with the importance of this clarification, but wonder if it dilutes the info provided in the main body (typ. various sections and chapters) where more stringent guidelines are being suggested, preface such with "Optional Local Requirement".
5. 2.1.1 It is confusing having Non-Exempt practices under the heading of Exemptions. Delete the subheading and/or reword to make this easier to follow.
6. 2.1.3 Move Exemptions: to after New and Redevelopment
7. 2.1.4 first paragraph, second sentence - add "including provisions for appeal of such decisions."
8. 2.3.2 Adjustments - Who is the drainage manual administrator?
9. Tie Chapter 2 together with later chapters containing the BMPs.

40 WSDOT:

1. Page 2-2: Table 2.A is confusing from a roadway perspective.
2. Page 2-8: What does "equivalent area" mean? Does this mean that stormwater mitigation or facilities can take place and be off site like at a site identified in a watershed plan?
3. Pages 2-8 & 9: Supplemental guidelines. What does "equivalent area" mean? Stormwater facilities could be very expensive and exceed or be the majority of a developments cost. Fee-in-lieu could be an advantage to local government and developers. Local government can use funds to get better stormwater improvements at more critical locations and develop can take place at less critical sites.
4. Page 2-30. 2.3.1 Financial Liability. WSDOT, as an agency of state government, is exempt from locally implied performance bonds.

Redevelopment – commercial/industrial

30 Yakima Co:

1. Need to clarify definition
2. No scientific basis for 35% impervious surface

32 Wenatchee UA:

1. 2-2 Feedback requested, page 2-5: This definition is reasonable for small sites. Further refinement is needed for large sites where impervious areas are large but a relatively small portion of the total property area. How is the site area determined? Parcel boundary? Area of commercial or industrial activity or use?
2. 2-3 Feedback requested, page 2-7: Each site should be evaluated on a case by case basis in terms of the level of pollutants they potentially discharge and the level and adequacy of their current stormwater system. For example, a site that was developed two years ago and has a stormwater problem should not be exempt. On the other hand, a ten year old site may have very adequate stormwater facilities. To what level will Phase II allow grandfathering?
3. 2.1.3, page 2-7: The fourth threshold currently reads: “Treatment facilities at the site do not perform according to the requirements of this manual.” We suggest revising to “Treatment facilities do not exist or are not performing according to the requirements of this manual.”
4. 2.1.3, page 2-8: Add a statement to the effect that local jurisdictions can require correction of existing stormwater quality and quantity problems upon redevelopment.

33 Spokane Co:

1. Re-development thresholds are arbitrary (i.e. 35%).
2. Page 2-5: 2-2 Feedback requested. Each local jurisdiction should establish its own definition.
3. Page 2-7, the third bullet needs to be re-worded. Once this manual has been in circulation for 5 years (or whatever the exemption from new treatment requirement is), this statement is obsolete.
4. Page 2-7, 2-3 Feedback requested. Five years seems to be a reasonable amount of time.

34 USPS:

1. What is the definition of commercial as used within the Manual?
2. Please clarify the language surrounding retrofitting and redevelopment activities associated with sites containing existing dry wells. If retrofitting of existing dry wells to Manual described BMPs is to be required via the UIC Rule Revision, then we recommend that a “grandfathering” option be available for existing drywells to reduce the economic and operational burden on regulated entities.
3. Project Thresholds/definitions: we suggest that those replaced or additional impervious surfaces associated with enhancements to storm water handling should not be counted toward the redevelopment, and project threshold including incrementally deployed projects.
4. The installation of treatment to achieve rule-authorization of an existing Class V dry well should be identified as being excluded from the definition of “project” within the Manual.
5. We suggest that local jurisdictions should not be able to create their own definition of a developed Site as a concession to businesses operating in multiple jurisdictions.

36 ACEC

1. 2-2 Feedback requested: Local jurisdictions should establish their own definition of “developed site”. For example, the Liberty Lake Sewer & Water District considers a developed surface as any change from the native condition.
2. Redevelopment: Should strive for “no net increase”. If an existing parking lot is repaved (and not expanded), then there is no increase in the impact. If the existing lot is expanded, then the increase in area should be addressed.
3. Page 2-7, 1st bullet: How often (east of the Cascades) are sites redeveloped within 5 years of a previous development action?

38 Ten Cities

1. Why was the Western Washington trigger of 35% used for considering a site to be a source of stormwater? The soil type and drainage characteristics better determine the potential for stormwater to migrate off-site. Particularly in eastern Washington where the rainfall is low and many of the soils are unsaturated and are highly permeable, the 35% threshold may include sites that have no runoff. A “developed” site should be determined based on the potential for polluted runoff from that site.
2. The redevelopment definition is too vague. According to a strict definition of impervious surfaces, replacing a roof would trigger the need to comply with these guidelines. The triggering mechanism needs to be changed to refer to the replacement of pollution generating surfaces.
3. The redevelopment threshold is met when all 4 criteria are met (bulleted items on page 2-7 & 8). The first 2 criteria are intended to limit the redevelopment definition to projects above a certain minimum size and impact. The fourth criterion is intended to recognize that the existing site stormwater controls may be adequate to protect water quality. The intent and meaning of the third criterion is unclear.
4. The redevelopment impervious percentage triggers don't make sense. Table 1.B appears to make it more restrictive to replace impervious than to add new.

39 City of Spokane:

1. 2.1.3 last paragraph under Supplemental Guidelines, revise to say "...to municipally-owned storm/combined sewer may continue..."
2. 2.1.3 last paragraph under Objective, "(When a structure or a property undergoes significant remodeling, local governments often require...) replace often with sometimes
3. 2.1.3 third bullet under Guidelines, eliminate reference to 5 years
4. 2.1.3 Stop loss provision ?? How does the Western Washington document address this issue? We are ok with how this reads, but it would be helpful to know where Ecology expects the limits to be... i.e. No more than 10% of the project costs are expected to be devoted to stormwater retrofit or ???.
5. 2-1.3 last sentence of second paragraph, "The Core Elements apply to all new impervious..." implies that the thresholds are not applicable here. Should this be rewritten?

40 WSDOT:

1. Page 2-5: *Feedback requested* 2-2. A developed site should have a standard definition. The definition should apply to any site that has any type of improvement or development. How does the definition of “developed site” apply to roads? Defining a developed site as one with at least 35% existing impervious surface coverage would be difficult to apply to roadways based on the current wording. Local jurisdictions should not be allowed to

establish their own definition. Overlays or replacement of impervious surface even down to sub-grade that do not increase or add impervious surface should not be considered as redevelopment because it is not changing the existing baseline.

Redevelopment – roads

26 WSTIB:

1. Requiring stormwater upgrades for conversion to asphalt is an undue economic burden for small cities (both E and W Manuals).

30 Yakima Co:

1. Exemptions for maintenance should be allowed as long as does not cause serious harm to environment
2. Chip seal on gravel roads should not trigger stormwater upgrades
3. BST provides dust control benefit under clean air requirements

32 Wenatchee UA:

1. Upgrading from BST to asphalt without widening does not represent a significant enough investment to warrant upgrading stormwater. In the Chelan/Douglas County area, this practice is considered maintenance and pavement preservation. It is extremely important to us that upgrading from BST to ACP be changed to an exemption. In addition, there is no hydrologic or water quality basis for making a distinction between runoff generated from BST and ACP surfaces.

33 Spokane Co:

1. Applying this manual when upgrading an existing road from dirt, gravel, or BST to ACP will have significant negative impacts on future road upgrade projects throughout Eastern Washington.
2. Information for Reviewers: If this box remains for the second draft, the phrase following upgrading dirt to gravel...should be replaced with: “the surface area becomes more impervious;” as written, it says there will be more impervious surface area (in amount).
3. 2-1 Feedback requested: The requirement to implement the Core Elements should be based upon runoff characteristics. The runoff characteristics do not change very much from hard packed dirt to ACP. Therefore, if area of coverage is not expanded, then this should be treated the same as an overlay.

36 ACEC Spokane:

1. p. 2-4: Non-exempt Practices: 2nd bullet – how can the pavement edge be extended without increasing the road prism? How is “road prism” defined?
2. p. 2-4 “Information for Reviewers”: When road surfaces are upgraded, the area becomes more impervious, there is not necessarily more impervious area. Once you have a vehicle track, the surface is typically considered as “impervious”; that is, less pervious than a natural or landscaped surface
3. p. 2-5, 2-1 Feedback requested: The residents owning the treated frontage typically pay for dust control, not a county agency. Depending on the operator of the truck and the surface condition of the road, there can be anywhere from an unnoticeable to a significant amount of free product left on the surface. This could create a problem if a sudden rain were to occur before the dust control agent can soak into the road surface.

38 Ten Cities:

1. The manual provides triggers for compliance on road projects based on material conversion (i.e. Gravel to BST to Asphalt etc.). Very small towns not covered under

Phase II frequently do these kinds of projects with state or federal funding. It appears the manual will be applied to these projects, and the added cost associated with compliance will be a hardship on these communities.

39 City of Spokane:

1. 2.1.1 It is not clear when discussing dirt and gravel in this section versus the glossary definition of PGIS when dirt or gravel roads may require treatment. We somehow need tie the fact that there are certain exemptions for non-paved roads with respect to treatment. This also needs to be consistent with the 6th paragraph under Guidelines in 2.2.5.
2. 2-1 Feedback Requested - Is there any current mandates that need to be covered re: dust control? We generally agreed that dust control should be left out of here and up to local jurisdictions to address as allowed.
3. 2.1.1 Under information for reviewers: we should not be concerned with dirt to gravel (this should be consistent throughout the manual)
4. 2.1.1 Alley paving will undoubtedly be a problem to provide treatment. Specifically within the existing platted areas of the city where we have 16 feet of r/w and pave 16 feet of asphalt. We should have an exemption for those alley sites where treatment is not practical. (Minimal treatment such as catch basins should be installed.)

40 WSDOT:

1. Page 2-5: Feedback requested 2-1. Recommend using a combination of the runoff characteristics based on new PGIS and cost of project. Dust control is a major issue on the east side, especially around Climatic Region 2, and is something that should be addressed. Stormwater treatment should be required when upgrading from gravel to BST or ACP. However, stormwater treatment should not be required when overlaying a BST rural road with ACP since the runoff characteristics are the same.
2. Page 2-5: Non-exempt practices, third bullet. Should be changed to state “Resurfacing by upgrading from dirt or gravel or to bituminous surface treatment (BST or ‘chip seal’) to asphalt or concrete. These are considered new impervious surfaces and are subject to all of the Core Elements.”
3. Page 2-5: *Feedback requested 2-2.* A developed site should have a standard definition. The definition should apply to any site that has any type of improvement or development. How does the definition of “developed site” apply to roads? Defining a developed site as one with at least 35% existing impervious surface coverage would be difficult to apply to roadways based on the current wording. Local jurisdictions should not be allowed to establish their own definition. Overlays or replacement of impervious surface even down to subgrade that do not increase or add impervious surface should not be considered as redevelopment because it is not changing the existing baseline.

Core Element 1

33 Spokane Co:

1. Core Element No. 1 should be a requirement; how can Core Element No 4, Preservation of Natural Drainage Systems and Outfalls be shown without a Site/Drainage Plan?

36 ACEC Spokane:

1. how is CR #4 met without showing how on a plan (CR#1)?

39 City of Spokane:

1. 2.1.2 It may not be possible or reasonable to address CE #4 without addressing CE #1 (stormwater site plan)

Core Element 2

33 Spokane Co:

1. Section 2.2.2 Core Element No. 2, Supplemental Guidelines, Page 2-11: Move the first paragraph to 'Guidelines' as it is a requirement (thus it cannot also be optional).

36 ACEC Spokane:

1. Page 2-11, Guidelines: What about discharge of sediments to the public right of way?

39 City of Spokane:

1. 2.2.2 Supplemental Guidelines, last paragraph, make Construction Stormwater Pollution Prevention required rather than suggested. Minimal treatment may be limited to nonwoven fabric over grate.

Core Element 3

33 Spokane Co:

1. Section 2.2.3 Core Element No. 3, Objective, Page 2-12: We suggest switching the words "stormwater" and "pollutants" in the first sentence. It should read "The intent of Source Control Best Management Practices (BMPs) is to prevent pollutants from coming into contact with stormwater."

36 ACEC Spokane:

1. Page 2-12 CR#3: how can source control BMPs be enforced? If they can't be enforced, then they shouldn't be in the standards.

Core Element 4

32 Wenatchee UA:

1. 2.2.4, page 2-13: It should be made clear the Eastern Washington Wetlands Rating System has not been adopted by Ecology and a final version will be available if they are adopted.
2. 2.2.4, page 2-13, 2-14: Do all of the criteria listed for hydrologic modification of a wetland have to be met?

33 Spokane Co:

1. Core Element No. 1 should be a requirement; how can Core Element No 4 be shown without a Site/Drainage Plan?
2. Revise the last sentence of the first paragraph under 'Guidelines' to read: Outfalls may require energy dissipation. Not all outfalls need energy dissipation: the need for and the design of an outfall is based upon flow rate, velocity and earth or soil condition at the outfall.
3. Item No. 1, in order of preference to maintain natural drainage channels, should be: Discharge in the same manner, at the same location, at the same flow rate and volume as was originally prior to discharge from development.
4. Under 'Applicability to wetlands,' does the second bullet imply that if any one of the following criteria are met, then a wetland can be considered for stormwater treatment? Or does it mean that all of the following criteria must be met? Reading the list, it would seem improbable to find many wetlands that meet all of those criteria.

5. Under 'Applicability to wetlands,' second bullet, fifth criteria: is the outlet orifice that is referred to going into or out of the wetland?
6. 2-4 Feedback requested. This information or scrutiny of wetlands seems beyond the level of what is expected in this Manual. Recommend leaving the bullet, but rewording it to say: The wetland does not exhibit any features that a wetland biologist believes will be threatened should the wetland be utilized for stormwater disposal. These features should be revealed and documented during the wetland rating process.
7. Supplemental Guidelines: Remove all suggestions in this section which reference acceptable point discharge rates. It may be necessary to verify the legal implications of allowing concentrated discharge onto an adjacent property where previously overland or sheet flow existed.
8. Appendix 2A, Eastern Washington Wetlands Rating Form, Page 2-32:
 - a. Does this rating form supersede current Ecology Wetland Rating Form?
 - b. This level of wetland analysis seems well beyond the level of what is expected in this Manual. It was understood that the rating of a wetland would always require the approval of Ecology and the wetland biologists would work directly with Ecology during the rating process. In addition, design coordination with Ecology would be necessary even when utilizing an "approved" wetland. Further, the Manual needs to indicate that any use in or near a wetland or buffer for stormwater management must be approved by Ecology, and having stated that, Appendix 2A could be removed and remain a tool for Ecology to distribute to wetland biologists, not civil design engineers.

36 ACEC Spokane:

1. How is CR #4 met without showing how on a plan (CR#1)?
2. Page 2-13 list of preferences: 1st preference should be to mimic the natural characteristics; #7 seems to contradict the objective stated in on page 2-12
3. applicability to wetlands: discharge to native wetlands (not designed for stormwater treatment/control) typically needs to have some sort of pretreatment. Lawns can be a big source of nutrients from fertilizer
4. page 2-15: Supplemental Guidelines, 2nd paragraph – need to define "significantly lower" concentrated flow. This needs to be coordinated with the case law on discharges onto a downstream property.
5. 3d paragraph: if no downstream conveyance system exists at the property line, then why allow one? Case law issue
6. 2nd bullet: what about increased flows impacting the groundwater regime (such as the Moran Prairie and West Plains areas in Spokane County)?
7. Who determines "significant adverse impact"?

37 Ecology:

1. The wetlands guidance provided in Appendix 2A is draft guidance (currently out for public comment) that should be finalized in February 2003. Ecology requests that the final guidance be included in the revised Manual and that our staff working on that guidance be made aware of proposed revisions to the Manual regarding its use (Tom Hruby at 360.407.7274).

38 Ten Cities:

1. Re Feedback Requested: This additional "scrutiny" will halt the use of almost every wetland for stormwater treatment. Most of the bulleted items listed here are subjective

and as such, can be used by interested parties to delay and obstruct the use of wetlands for treatment. It may be more useful to use existing wetland classification systems to delineate the types of wetland that should not be used for stormwater treatment. The existing Draft Wetland Rating System for Eastern Washington should be used to help define the types of wetlands that are not suitable for stormwater treatment. It is assumed that the Phase II communities will adopt this wetland rating system and use it to identify wetlands within their legal boundaries. If the exceptions could be based on the same criteria for identifying wetlands, the subjective nature of the exceptions would be limited. Also see Ecology Pub. 96-06 regarding water quality standards and wetland activities.

39 City of Spokane:

1. 2-14 Feedback Requested - The criteria for wetlands does not contain quantifiable standards. Are such numbers, measures or thresholds available?
2. Appendix 2A - Eastern Washington Wetlands Rating Form We have some concern that extensive wetlands guidance is appropriate to other documents and not to this manual. One concern is that as a municipality, our staff might be expected to interpret the information and give guidance. We have limited resources for that purpose and I suspect smaller jurisdictions may have no staff members up to that challenge. It may be a better solution to give reference to other appropriate documents.
3. 2.2.4 first paragraph under Guidelines, final sentence should read, "All outfalls must address energy dissipation as necessary."
4. 2.2.4 and other locations - it may be worth considering adding at least one more level of numbers, for example 2.2.4.1, since at least this section becomes confusing with numbers, solid bullets and open bullets.
5. 2.2.4 Supplemental Guidelines - Although these bullets seem reasonable, we should not deviate from court findings such as Halverson vs. Skagit County where the findings stated that "...and the surface waters are not artificially collected and discharged upon the adjoining land in quantities greater than or in a manner different from the natural flow thereof." We may wish to research additional cases and RCW's etc. to assure ourselves that we are in general conformance when giving specific numbers. Simple may be best!

40 WSDOT:

1. Page 2-13: A wetland can be considered for hydrologic modification and/or use in stormwater treatment if Category 4 and some types of Category 3. However, there does not seem to be good criteria on what one should consider for hydrological modification or use. This is somewhat covered in Chapters 5 and 6 but not tied together well.
2. Page 2-14: Feedback requested 2-4. Artificially or inadvertently created wetlands at sites in uplands, dry coulees, drainages, etc. that were historically not present, but developed due to irrigation improvement projects or runoff should be allowed to receive stormwater.
3. Page 2-32. Appendix A. What is the reason for including the Eastern Washington Wetlands Rating Form as an appendix to Chapter 2 or in the manual?

Design storms for CEs 5 & 6:

Public Workshops:

1. Option 4 is best for region 2
2. Design storms should be left to local officials and consulting engineers

30 Yakima Co:

1. Design storms need to be listed clearly where can be easily looked up
2. Local jurisdiction should set design storms until science supporting custom storms is accepted
3. 6-month event for treatment and 25-year event for volume are adequate

32 Wenatchee UA:

1. 2-8 Feedback requested, page 2-25: Comments on design storms have been deferred based on the knowledge that further work will be performed in this area. TR-55 methodology with the SCS Type II storm event has typically been used for most designs in the Chelan/Douglas County area.

33 Spokane Co:

1. It is Spokane County's position that the SCS method and the Type II 24 hour storm needs to remain as an accepted and available method for water quality and flow control design. Spokane County also feels that the Eastern Washington Stormwater Manual should endorse the option of utilizing alternative design methods if the individual jurisdiction feels a particular method better meets its needs. The choice of the design method and storm distribution should be left up to the local agency.
2. Local jurisdictions should be able to use the hydrology methods currently in use.
3. Page 2-26, third bullet: A detention pond should not be designed using two different storm durations.

36 ACEC Spokane:

1. The long duration storm, also called the regional or winter storm appears to have been created with reasonable science. It is however very arguable that significant peer review by local qualified engineers who have significant expertise in hydrologic analysis has not occurred. Many challenges face local practicing engineers if this new event is mandated. As an example, this winter storm model can't be fitted for Soil Conservation Service or Santa Barbara Urban Hydragraphic Method Distribution. We strongly suggest that a minimum two-year period be allowed wherein existing modeling/storm event approaches now utilized in Eastern Washington are kept as valid. This approach will allow timely and accurate comparisons of process and results not only for practicing engineers, but developers and agency managers.
2. Engineers in Eastern Washington amongst several engineering council members believe that there is a good functional relationship between current pond sizing methods used in the Spokane County Stormwater Guidelines and actual field runoff rates and volumes. It is our belief that tighter more conservative calculations requiring larger storm treatment facilities must be justified with solid science that can be rationally analyzed and agreed to. It is not beneficial to have more stringent calculations only for the sake of being more conservative.
3. Local jurisdictions should decide which design storms should be used. Our office uses historical storm data for the Tri-Cities to create our storm models. Folks using other custom design storms based on local historical data will submit those for consideration during this public comment period. But in the case that a different design storm is specified and established in the final manual, the local jurisdiction would have to demonstrate that a differently developed design storm will provide the same or higher level of protection as the one prescribed in the manual.

37 Ecology:

1. Treatment facility sizing criteria (pp. 2-19 to 2-21): Due to the wide variety of natural settings in eastern Washington, Ecology would like Core Element #5 in the Manual to maintain as many appropriate alternatives as possible for jurisdictions to use as guidance in establishing their own local design criteria. To this end, we request that the revised Draft Manual include reliable modeling guidance for utilizing the custom regional design storms to generate estimates of runoff volumes and flow rates, regardless of the outcome of the Subcommittee's decision-making process for Core Element #6 Flow Control.
2. *(Feedback Requested 2-8 and 4-1)* Design storms and hydrologic modeling: The selection of design storms identified for flow control in each region must be based on achieving the primary environmental objective of the Manual which is protecting the biological functions of stream channels in eastern Washington. The Subcommittee should consider this objective separately from the engineering design considerations. Once an appropriate target is established as meeting the environmental objective, the committee can decide the best way to reach that target in consideration of the limitations of existing methods and technologies – but these limitations should not determine the target.
3. Ecology is open to considering new information in defining that target, and we hope that Subcommittee members are equally open. Ecology hopes to assist the Subcommittee in gathering additional information and procuring the assistance of consultants with appropriate technical expertise to resolve the question of what design storms will protect biological functions of eastern Washington streams and what modeling approaches will provide the most reliable estimates of pre- and post-developed runoff volumes and flow rates. We believe that bringing such information and expertise to the Subcommittee will help to resolve the majority of the issues raised here.
4. We also ask that the Subcommittee support us in asking the engineering design community to be open to considering new information and making necessary adjustments in responding appropriately to that information.

38 Ten Cities:

1. p. 2-19 Information for reviewers: This approach is welcomed since there is plentiful data available to describe eastern Washington storm events and tailor the design storm events to the unique eastern Washington climate.
2. In Region 2, Option 6 seems reasonable for this area. Region 1 and 4 probably do not have any design standards in place at this time and will be looking to Ecology for direction. Option 1 could be used, but it would be need to be modified when a final flow control standard is adopted by Ecology. Region 3 has the Spokane County example to work from. Option 4 could be used in Region 3. It is difficult to imagine a situation where both the long-duration winter storm and the short-duration storm would be used to design facilities. It seems that designing for the “worst-case” scenario would protect water quality in both events.
3. “If both design storms are required, the facility will need to be designed to operate one way in the summer and another in the winter/spring.” Just prior to this comment, it is stated that both short and long duration storms should be considered for any eastern Washington storm event. These seem to be disconnected. They also generally ignore the fact that most systems are passive and will be “operated” passively. Also, longer term events tend to spread runoff over larger areas reducing the peak load at any one location.

4. The most critical event for any system to handle in eastern Washington is probably the event that puts the largest load on a “system” in a relatively short time. Suggest that analysis and design go down that road. Identify the largest credible event, then design and operate for it.

39 City of Spokane:

1. We have a general concern regarding moving to a region 72 hour-long duration storm and the appropriate modeling method. Although our group is generally supportive of moving in this direction, the modeling data to date suggest a significantly larger storm volume than what we have seen using the SCS method. Previous analyses may not be statistically accurate using the SCS Type II storm, but we have not identified failures as a result of this existing methodology. Please spend the time necessary to test the new design storm out along with the appropriate methodology before full implementation. The City may have several basins that could be used for calibrating and testing different design methods. The burden should be with Ecology and the TAG to document the effectiveness of the new method(s).

40 WSDOT:

1. Page 2-25: Feedback requested 2-8. Each climatic region should use the new design storms for both the long and short storms, but be allowed to use the new design storm with the currently available tools (i.e., computer modeling software programs) or federal modeling programs like SWMM. Until the new tools have been properly identified and validated, the designers should be allowed to use the current design methodology.

Snowmelt factors for CEs 5 & 6

Public Workshops:

1. Snowmelt factor should be different for roof areas and landscapes versus plowed road, parking, and other areas

30 Yakima Co:

1. Snowmelt factor should not be included

32 Wenatchee UA:

1. 2-5 Feedback requested, p. 2-20: Snowmelt should be addressed. Some of our most consistent discharges come from snowmelt. It is not clear whether applying a snow melt factor produces an accurate water quality design flow. We usually get at least once a year a winter or spring thaw (sometimes with rain; however, often it is associated with warm Chinook winds) in which 4-8 inches of snowmelt that produces significant runoff. The following considerations should be included in a snow melt analysis:
 - a. Snowmelt factors should not be applied to summer thunderstorm design events.
 - b. How does snow plowing or maintenance impact discharges. Snow is often plowed into detention facilities.
 - c. Should there be requirements for snow dump sites?
 - d. Where sanding is performed, snowmelt runoff can be particularly high in sediments. Cold weather BMP's can address sand sediment loads.
2. 2-7 Feedback requested, page 2-24: See comment above.

33 Spokane Co:

1. Page 2-20 and 2-24, 2-5 and 2-7 Feedback requested: A snowmelt factor should not be applied to any climatic region. Each local jurisdiction should reserve the option as to when and if to implement any design criteria related to snowmelt runoff.

2. Section 4.2.7 Rain-on-Snow Design Storm, Page 4-28: The statement in the third paragraph that ‘adding inches of snowmelt (water equivalent) to the design recurrence interval storm should preserve the approximate probability of the design recurrence interval’ is an incorrect assumption. The design recurrence interval storm magnitude whether it be in the form of the “2-year precipitation depth” or a hydrograph that represents the rainfall distribution associated with a 2-year event, these magnitudes are going to vary depending upon the recurrence interval (i.e., 2 yr versus 100 yr). The amount of snowmelt proposed is a constant value. It would be a false assumption that adding the very same constant rainfall depth (water equivalent of snowfall accumulation) to the 2 year, 10 year etc. recurrence interval would result in “preserving the approximate probability of the design recurrence interval.” Some other numerical approach is warranted for the option to include a snowmelt factor into the design of a stormwater management facility.

36 ACEC Spokane:

1. p. 2-20, 2-5 Feedback requested: More study is needed

37 Ecology:

1. *(Feedback Requested 2-5 and 2-7)* Snowmelt factor for runoff treatment and flow control: Ecology recommends that snowmelt be included in runoff calculations on all areas except for the areas of Region 2 where the average daily snow depth is less than one inch. Considering snowmelt in runoff calculations at any place with greater than one inch average snow depth is a prudent recommendation based published investigations of runoff produced by rainfall on snow pack.

38 Ten Cities

1. For treatment: The Manual developers did a good job of identifying the unique eastern Washington storm events for rainfall. Is there data available to develop snow accumulation occurrences?
2. For flow control: See comments on wetlands criteria (under CE 4 above)

39 City of Spokane:

1. 2-5 Feedback Requested - A requirement for a snowmelt analysis should be a local decision based on basin characteristics.
2. 2-7 Feedback Requested - No, although it may be easier for some jurisdictions to require this additional calculation, the City of Spokane (and I presume others) is in a position to know which basins and areas are significantly affected by snowmelt. This may be a necessary requirement in Regions 1 and 4.

40 WSDOT:

1. Page 2-20: Feedback requested 2-5. Snowmelt should not be added into the precipitation for sizing water quality treatment facilities. There is no science to determine if this is a problem. Snowmelt comes off at a slower rate or time interval than storm runoff. This normally causes a flooding problem if it comes off rapidly or under a rain on snow or frozen ground event. WSDOT feels that water quality treatment is adequately met through the treatment of the 6-month event.
2. Page 2-24: Feedback requested 2-7. Yes, the snowmelt factor should be applied to every climatic region for flow control. Even in Region 2, there have been severe Chinooks during heavy winters. Snowmelt seems to be a factor in natural or landscaped areas where snow accumulates naturally. Snow plowed off the road is not a factor in increasing runoff. Care should be taken so as to not overcomplicate the analysis,

especially since SCS methods are not valid for computing runoff from rain on snow events.

Core Element 5

Public Workshops:

1. BMP requirements should be left to local officials and consulting engineers

30 Yakima Co:

1. Local governments should have flexibility to allow other effective post-development water quality controls not in the manual.

32 Wenatchee UA:

1. 2.2.5, page 2-18: Parking lots should be considered under high use sites. Typically, parking lots with more the 20 stalls may be considered for needing oil/water separation. Average Daily Trips should be considered in the evaluation of whether or not the parking lot is a high use site.

33 Spokane Co:

1. Thresholds for treatment, such as 5,000 sq. ft. of new impervious area for treatment requirements, are often based upon the thresholds of Westside jurisdictions and not based on scientific studies.
2. This Manual requires treatment for runoff from fertilized lawns. It has been our contention that the water quality storm does not result in runoff from pervious surfaces in Eastern WA.
3. Multiple “treatment trains” are required for “High ADT” intersections. There have been no estimates of costs associated with this level of treatment, and no consideration given to whether or not there is room in a typical ROW to implement more than one type of treatment.
4. Third paragraph: Under ‘Guidelines’ should be stated that although only one water quality method based on rate and one based on volume can be utilized per local jurisdiction, if dispersal and infiltration are appropriate and can still meet the treatment requirements, then they would be allowed. As it reads, it seems in conflict with the “only one each of two types of treatment allowed...” criteria.
5. 3rd paragraph: Clarify what is meant by dispersal and infiltration. The only place that dispersal is mentioned is 5.5 – Natural Dispersion, which seems to be only for single-family residences. All of the examples shown in Chapter 5 require collection to get to the infiltration area. Explain how this works.
6. Unvegetated road shoulders should not be required to be treated as there isn’t regular vehicle travel on the shoulders to warrant treatment of pollutants. On Page 2-17, second paragraph: move unvegetated road shoulders to regularly-used surfaces that may be excluded from PGIS areas. Some PGIS areas may not be required to be included in the calculations for treatment if they are ineffective (i.e. not hydraulically connected to the other PGIS areas that drain to the treatment system). As with the definition of “ineffective impervious surfaces,” even sidewalks that are adjacent to a roadway may be excluded if they are sloped away from the road and flow instead onto a grassy strip parallel to the road/walk. It would be better to describe the areas as hydraulically connected or not hydraulically connected versus attempting to list every possible scenario.

7. Page 2-18, first paragraph: It has been requested in previous comments that “discharge from certain industrial and commercial sites” be defined. This section has been revised in this draft to prohibit ‘hazardous substances.’ Whether it be “discharge from certain” businesses or “hazardous substances,” both statements are ambiguous and need to be defined. In addition, a list of hazardous substances needs to be given.
8. Page 2-18, fourth bullet: This information is too detailed for a set of minimum standards guidelines. It should be reduced to a statement that refers the designer to the local jurisdiction’s Traffic Engineer.
9. Page 2-19, second paragraph: Remove the sentence “Local jurisdictions should also identify a preferred method to calculate water quality design volume.” The local jurisdictions are already directed to pick one each of the two types of water quality treatment: flow rate and volume; whichever method they choose for volume will be the one and only method, and subsequently the ‘preferred’ method for sizing of volume based treatment facilities.
10. Page 2-20, Change Preferred and Alternative Methods to Method 1, Method 2, etc.
11. Page 2-20, Item No. 1, Region 3 volume sizing should read: “...runoff from PGIS that are hydraulically connected to the treatment facility. Credit for infiltration through the swale bottom may be granted for sizing treatment facilities using this method.” Replace “impervious surface” with “PGIS” throughout this item.
12. Page 2-21, 2-6 Feedback requested: Volume based treatment facilities should not be required to divert volumes that exceed the design (25 year) storm. A Supplemental Guideline could be added that recommends that in areas where downstream conditions would allow bypass of larger design storms, it would be appropriate to consider. (In most cases, this is not feasible as there would be nowhere to bypass it too. Swales typically overflow back out into the street if their capacity is exceeded during a larger event storm.) Note that the paragraph above “Supplemental Guidelines” already requires a bypass. Why is feedback requested on this issue if it is already required in this document?
13. Page 2-21, first bullet, the references to ‘longer time interval than the computation time step’ may turn out to be a correct statement in one case, but not both. Until the details of how to model the custom long and short duration storms have been worked out, The Manual should not include speculations on what may or may not be necessary when modeling these, or any, storms.
14. Page 2-21, first bullet, the BMPs in which a time interval/time step is specified need to be listed as we have been unable to find the BMPs to which this statement refers.
15. Page 2-21, Supplemental Guidelines: The statement that “Stormwater treatment facilities are not allowed within a wetland or its natural vegetated buffer...” is in conflict with the instances where it is already specified to be acceptable (see Page 2-13 and 2-14 regarding Category 3 and 4 Wetlands). Also, it has long been acceptable with Ecology personnel in Spokane to employ vegetated grassy strips nearby and/or parallel to wetlands to allow treatment prior to subsurface discharge (i.e. recharge) to the wetland.

34 USPS:

1. The USPS suggests additional investigation into determining actual pollutant loading associated with parking lots. Investigation should strive to deliver some objective standards where possible. Using ADT for roads seems reasonable but the USPS struggles to see how Traffic Estimations reflect exposures from parking lots. Average Daily

Vehicle trips, and pollutant loading (light or heavy) all affect which Manual elements will be mandatory.

36 ACEC Spokane:

1. Page 2-18: 2nd bullet – heating fuel handling & storage sites should be included; 4th bullet – too detailed. This will increase right of way costs by a significant amount!
2. Page 2-19 – Information for reviewers: new models should be field tested and compared to existing models before a willy-nilly implementation is required. Do the models reflect reality with a reasonable degree of reliability and accuracy?
3. Need to evaluate storm runoff data – what event really generates the threshold volume? Spokane County’s research indicates that 80% of the contaminants is a reasonable threshold. At what point does the cost of the extra effort outweigh the benefits?
4. Page 2-21 2-6 Feedback Requested: Yes! The bypass should be tuned to the water quality treatment storm event

37 Ecology:

1. The Draft Manual does not address pollutants in runoff from pervious surfaces. While saturated ground conditions do not occur in eastern Washington at the same frequency as those conditions occur in western Washington, there are pervious surfaces in eastern Washington that are known to generate runoff, especially during commonly-experienced intense summer thunderstorms. Ignoring these sources may result in under-design of stormwater BMPs. In particular, contribution of runoff from these surfaces may affect the performance of flow-rate-based runoff treatment BMPs. We recommend that project engineers include estimates of runoff from pervious surfaces in designing BMPs that have flow-rate-based design criteria.
2. Sidewalks may be pollutant-generating if they are commonly salted or sanded to prevent formation of ice on the surfaces. This should be addressed in the stormwater site plan and appropriately considered in sizing treatment facilities.

38 Ten Cities:

1. The general requirement for treatment of stormwater discharging to drywells that are 1) located above an aquifer of “moderate or high susceptibility” and the discharge is from any “pollutant loading source area” or 2) located above an aquifer with “low susceptibility” and the discharge is from a “moderate or heavy pollutant-loading source area.” Such general requirements are overly conservative and do not consider many factors that influence aquifer susceptibility. For example, the type of pollutant is a very important factor and most urban runoff contaminants are not particularly mobile in the soil or groundwater environment. Contaminant solubility and soil chemistry also will influence potential risks to receptors. At a minimum, there should be an alternative that allows for impacted entities to demonstrate that impacts will be insignificant without treatment on a case-by-case basis.
2. There are no definitions on what is low, moderate and high regarding pollutant source area. These must be defined to assess impacts.
3. p. 2-21 Re Bypass: This “request for feedback” is confusing. It infers that all treatment facilities be designed to treat the 25-year storm, which is excessive. In addition, we assume that by-pass does not necessarily mean an engineered system, since it is impossible to design a conveyance that can handle every size storm.

39 City of Spokane:

1. 2-6 Feedback Requested – (Bypass required?) yes, consistent with last paragraph in section "Water Quality Design Flow Rate"
2. 2.2.5 Objective - The statement "a conservative approach is suggested" is not necessary. Just prescribe the standard.
3. 2.2.5 first paragraph - change wording to "Note that discharges to drywells that contain processed water or any other discharges..."
4. 2.2.5 Treatment Facility Sizing, page 2-19 - change to "a water quality design volume, or a water quality design flow rate"
5. 2.2.5 top of page and pages 2-20 and 2-21 - "water quality design volume" and "water quality design flow rate" should be formatted the same.

40 WSDOT:

1. Page 2-17: "Runoff treatment is required for all projects creating 5,000 square feet or more of pollutant-generating impervious surfaces (PGIS) with discharges to surface waters." What storm event do you analyze to consider discharge to surface water? If the water quality design storm does not reach surface water then no further treatment is required.
2. How will a designer know how to distinguish "heavy pollutant-loading source areas"? There are categories that include rural highways and residential streets, urban highways and arterials, and high traffic intersections. All need further definition such as Average Daily Travel (ADT). See comments under #78.
3. Page 2-19: Treatment Facility Sizing: "Each local jurisdiction must adopt only one of each of the following criteria in order to provide for consistent sizing of treatment facilities: a water quality design volume, and a water quality design flow rate." WSDOT disagrees. Engineers should be able to pick and chose between methods that best fit a particular site.
4. Page 2-21: Feedback requested 2-6. No, it should be based on site conditions considering flood control and damage. Facilities should be design with an overflow if deemed necessary.
5. Pages 2-21 & 22: Supplemental Guidelines. "Stormwater treatment facilities are not allowed within a wetland or its natural vegetated buffer except for: Necessary conveyance systems approved by the local government; or As allowed in a wetland mitigation plan." How does this statement correspond to the idea that Category 4 and some Category 3 wetlands can be considered for stormwater treatment use? Add non-jurisdictional wetlands like irrigation caused, man-made, designed for stormwater treatment, etc. to the bulleted list.

Core Element 6

30 Yakima Co:

1. Detention should not be required for direct discharges to major rivers or to storm drains with sufficient capacity that discharge to major rivers. Channel forming flows in large watersheds are not affected by urbanization.
2. Flow control should be required for discharges to small creeks in urban areas. These creeks typically have low base flows and are sensitive to urbanization.
3. A study of the impacts of urbanization on E WA stream ecological function should be sponsored by Ecology.

32 Wenatchee UA:

1. 2-6 Feedback requested, page 2-21: Volume based BMPs should have bypass system most of the time. There are cases where bypasses may not be necessary.
2. 2.2.6, page 2-23: Local jurisdictions should be able to specify the total amount of impervious surface that triggers the Flow Control Core Element #6. 10,000 SF can be used as an upper limit for all jurisdictions; however, an agency may wish to reduce the SF requirement (Chelan County uses 5,000 SF).
3. 2.2.6, page 2-26: Information for reviewers. Do not include devices that require manual operation such as changing diversions.
4. 2.2.6, page 2-27: Does “post developed 25 year runoff” under exemptions #2 and #3 mean total runoff from the site or additional runoff from the development?
5. 2.2.6, page 2-27: Exemption #4 should be clarified that it pertains to large sites with very little impervious area. This exemption may need to be tied to land use zoning.
6. 2.2.6, page 2-28: Can this list be expanded short of making more work for local agencies by requiring an exhaustive watershed plan?

33 Spokane Co:

1. We recommend that Ecology explore the idea of doing a comprehensive study of eastern Washington creeks and streams to identify characteristics that would require flow control protection. There are not that many creeks and streams in eastern Washington compared to the west side of the state. There may be streams in eastern Washington that do not support the habitat that flow control requirements would protect.
2. Page 2-27, Item No. 2 under Exemptions: Most downstream properties to which stormwater discharges are not “under the functional control of the project proponent.” This wording should be deleted and replaced with a requirement that a downstream analysis be completed and any potential downstream impacts mitigated.
3. Page 2-27, Item No. 4 under Exemptions: Replace reference to long duration storm with design storm.
4. Page 2-28, Item No. 6 under Exemptions: The free-flowing reaches of the Spokane River should be included in the list of rivers exempted from flow control requirements. The amount of stormwater runoff discharging to the Spokane River is small in comparison to the total flow in the river during the winter and spring seasons. Because of the 30-40,000 cfs flow normally passing through the Spokane River every spring, the few hundred cfs coming from the City’s stormwater sewer system or other stormwater outfalls will not cause detrimental impacts to stream morphology.
5. Page 2-28, Item No. 9 under Exemptions: End this exemption after the word “events.” Ecology defined intermittent streams/channels as those that only flow in direct response to precipitation, and have stated during previous Manual Subcommittee meetings that discharge to intermittent streams does not constitute discharge to waters of the State. This issue was specifically discussed at length in an effort to determine what type of channel/stream constitutes waters of the State.

37 Ecology:

1. Pre-development “existing condition,” page 2-24: Tree cover has a moderating influence on runoff generation during rain-on-snow events, and reduction in tree cover should be a primary consideration in evaluating the change in pre- and post-development runoff volumes in many areas of eastern Washington. Ecology recommends that the Subcommittee consider that whenever a forest conversion has occurred, natural forest

cover conditions should be used to calculate pre-development runoff. This would not apply to vast areas of Regions 2 and 3 where forest cover was not present in the natural predeveloped condition.

2. Chapter 2, Core Element #6 Flow Control: The Manual should include a short section with guidance or references for project proponents to use in designing projects that generate less runoff. In particular, it makes sense to discuss alternatives for sidewalks, parking areas (especially overflow parking), selected roadways, and other traditionally impervious surfaces. For example, porous pavement has been demonstrated to be effective in road projects in Arizona, and grassed pavers are in use at WSU Tri-Cities campus. These practices may reduce heating of summer runoff and allow more on-site infiltration.

38 Ten Cities:

1. The Manual requires the post development release rates must be held at 50% of the predevelopment release rates. This appears to be based on the fact that post development releases will be longer in duration due to the % impervious increase. The theory is that longer duration releases are detrimental to receiving systems. How was the 50% criteria developed?
2. The tacit assumption in reading the manual seems to be that runoff from storms in eastern Washington directly, and negatively impacts streams. Thus the emphasis in the first part of Ch 5 on detention and retention structures. This emphasis may be misplaced. The construction of such structures in an arid to semi-arid climate could easily be detrimental to long-term watershed health as it will promote evaporative loss of rainfall runoff when that runoff could be more beneficial to a watershed by allowing it to infiltrate into the ground and eventually recharge groundwater (and later yet surface water). The reality for much of eastern Washington is that the climate dictates that as much rainfall runoff as possible be captured for infiltration to maintain aquifer and watershed health. Emphasize infiltration of runoff as a preferred option where that run off will not negatively impact groundwater quality.

39 City of Spokane:

1. 2.2.6 Guidelines, first paragraph - after "Discharges to groundwater are exempt from flow control requirements." add, ", unless local conditions such as high groundwater levels require restrictions."
2. 2.2.6 Exemptions, item 6 - we need to consider the free flowing portions of the Spokane River or provide sufficient supporting evidence of adverse impacts that are not remedied with the existing dams.
3. 2.2.6 Exemptions - the first sentence after order and before fulfill, add "to"

40 WSDOT:

1. Page 2-23: Concur that infiltration is the preferred method of flow control for urban runoff. It is the preferred method for all runoff, both rural and urban.
2. Page 2-24: How are Category 4 wetlands excluded from flow control? What is the process or criteria?
3. Page 2-28: Exemption 6. This exemption, even though they are not specifically named, appear to apply to reservoirs in the Yakima, Tieton, Naches and other river systems that were developed and controlled for irrigation and other purposes. Intermittent, seasonal streams with no defined water channel should also be included in the exempted water body list.

4. Page 2-28: Exemption 9. Most streams in the non-mountain areas of eastern Washington fit this description. Does the reference to “does not discharge directly to a perennial stream.” refer to the intermittent stream or the project? Nearly all intermittent streams discharge during spring snowmelt to a perennial stream or river. There are some that do not such as in the Spokane Valley.
5. Page 2-29: Exemption 10. The reference to impervious area should be “effective impervious” not total. What is the evidence that impervious areas away from streams in eastern Washington have an adverse impact on the hydrology of the system?
6. Page 2-29: WSDOT realizes that work is being done to determine if flow control, to protect stream morphology, is required on all streams in eastern Washington. We look forward to assisting in and evaluating that effort.

Core Element 7

32 Wenatchee UA:

1. 2.2.7, page 2-29: How can operation and maintenance requirements, manuals, etc. be enforced and tied to the property? Chelan County requires Notice to Title for a Condition of Approval on certain land use applications and a Maintenance Agreement with an Auditor’s File Number on Plats.

39 City of Spokane:

1. 2.2.7 O&M plans for commercial and residential - we (the City of Spokane) can only address a problem with our stormwater ordinance if we receive a complaint from someone other than the City. If we need to discuss the lack of maintenance with residential and/or commercial sites, we may have to revisit this area in the ordinance. We have some concerns about the cost of enforcement.

Core Element 8

30 Yakima Co:

1. Manual (CE 1) reminds reader to look for and consider critical areas in planning stages. Activities affecting the critical area (construction, discharge, etc.) require critical area review or permitting by the appropriate local government authority. For example, 7.2.2 discusses discharges to streams, which may require special permits or consideration beyond stormwater control. This would apply to both construction controls and to permanent controls.

37 Ecology:

1. Chapter 2, Core Element #8: This Core Element should include implementation of planning and other recommendations from basin studies related to water quality. It should also address requirements of TMDLs, or water clean-up plans.

40 WSDOT:

1. Page 2-30: Core Element 8 – Local Requirements. WSDOT should not be subject to all local requirements “for any other purpose”. As described earlier, WSDOT, as an agency of state government, is subject to federal and state regulation, but exempt from local ordinances. WSDOT has a long history of incorporating stormwater requirements in its projects and maintenance facilities and activities.

Chapter 3 Site Plans

32 Wenatchee UA:

1. Appendix 3C, page 3-11: Include elevation datum, north arrow, right of way, outfall, and ditch details. Long-term maintenance information should also be included in the plans.

33 Spokane Co:

1. Page 3-1, Step 4 should be revised to state “Provide a copy of Ecology approved Construction SWPPP.”
2. Page 3-2, Add third bullet: Observation of potential runoff contribution from off-site basins.
3. Page 3-2, Add the words “propose to” between “that” and “discharge” in the first sentence under ‘Offsite Analysis.’
4. Page 3-4, Step 4 : All of this information should be either be removed or the heading should be revised so that the reader understands that this a Ecology approved item and that it is a part of a Construction Stormwater General Permit which is reviewed and approved only by Ecology.
5. Page 3-6: Add to the list of items to submit for a plan change: “Revise and resubmit a new report if any calculations have been changed.” Loose sheets or even a separately bound document have the tendency to get lost or separated from the originally accepted report. It is good practice to require a “new” report, printed in its entirety, for the project file.
6. Appendix 3A – Offsite Analysis, Page 3-7: It is unclear if Offsite Analysis is required. If it is, then none of this is Supplemental, it should all be entitled “Guidelines,” as this is the process that must be followed if an Offsite Analysis is warranted.

36 ACEC Spokane:

1. General comment. Overall Chapter 3 is a good guideline and pretty well done.
2. General comment. There is an excessive use of the words “all” and “any”. These words do not improve clarity. Guidelines are stronger without them, as omitting them promotes a more reasonable mindset and predisposition by both the review agency and the developer. Look in the other chapters of the manual to see if the same holds true.
3. Page 3-1, Section 3.1, 4th paragraph. The goal of the chapter is to “provide a framework for uniformity in plan preparation.” This is an excellent goal. It improves the chances of uniformity throughout the review process from agency to agency and city to city, and even greater specificity might be appropriate in some areas.
4. Page 3-1, Section 3.1, 5th paragraph, 6th line. The word “should” should be replaced with “shall”. The rest of the paragraph outlines the fact that State law requires the work to be stamped by a P.E.
5. Page 3-2, Offsite Analysis, 1st paragraph. A sentence reads, “An initial qualitative analysis should extend downstream for the entire flow path from the project site to the receiving water or up to one mile, whichever is less.” I could not find a definition of receiving water that indicates what constitutes the receiving water. Is it a perennial stream? Ephemeral? A borrow ditch that is well defined???
6. Page 3-6, Stormwater Site Plan Changes. 4 should be items required with the first one as follows: “1. Brief narrative description of the change and the purpose/reason for the change.
7. Page 3-6, Final Corrected Plan Submittal. This talks about Record Drawings and indicates that corrected drawings must be “professionally drafted”. This is unnecessary.

In many cases, legible hand written notes or corrections clearly noted (with clouded area) are entirely adequate. Why require the expense of “professionally drafted”. Either/or should be allowed.

8. Page 3-7, Appendix 3A; Objective paragraph. The “Objective” statement should be more positive. Currently it is negative. It starts the regulatory review person out with the mindset that development is “bad”. Development is inevitable and necessary, and the idea that progress and development can be done while totally preventing or eliminating impacts is unrealistic. Rather the mindset should be to “mitigate”, “reduce”, “minimize”, etc. impacts. Most developers want to reasonably control and reduce impacts. This needs to be balanced with regulators who are trained (i.e. the Stormwater Manual) with reasonable plan review expectations. Proposed revised wording is as follows: Objective: To identify and evaluate potential offsite water quality, erosion, slope stability, and drainage impacts that could result from the proposed project, and to determine measures to mitigate potential impacts or mitigate aggravating existing problems. Aggravated means increasing the frequency of occurrence and/or severity of an already existing problem.
9. Along the same lines, reword the next section as follows: Supplemental Guidelines: Some of the common negative impacts of land development can be erosion of... However, taking the precautions of offsite analysis can reduce future property damage and public safety risks.
10. Page 3-7, Task 1. Showing property lines should not be a blanket requirement for off-site analysis. Furthermore, showing property lines on a USGS quad in most cases can’t be done with any clarity. Use wording that specifies when they should be included (i.e. if it affects drainage provisions, need for easements, etc.).
11. Page 3-8, Task 3. The next to the last bullet requires contacting “neighboring property owners, and residents”. This should be a suggestion depending on the situation and not a requirement.
12. Page 3-10. 2nd bullet item. The words, “field verified by the engineer” should be deleted. The plan will be stamped by the engineer. And the necessity of this should be left up to the judgement of the engineer.
13. Page 3-10. Last bullet item “Existing easements”. I assume this means drainage easements. I don’t see a reason to show all easements.
14. Page 3-11. 1st bullet item. What does “all systems” mean? Needs to be more specific.
15. Page 3-11. 10th bullet item. “...all survey information”. Why and what survey information is required? It seems enough to only say, “Drainage easements shall be shown.” A determination of what is appropriate for research and/or surveying should be left up to the judgment of the engineer.

39 City of Spokane:

1. 3.2.1 under Offsite Analysis and Mitigation Procedure, third sentence - regarding the reference to one mile add "or to a point where the impact to receiving waters are minimal or nonexistent as determined by the local jurisdiction."
2. 3.2.2 under Final Corrected Plan Submittal, eliminate "civil" in the last sentence.
3. Appendix 3A - Offsite Analysis, last bullet under Supplemental Guidelines, add "or any other known violation that exists."

Chapter 4 Hydrologic Analysis

See also comments above on Design Storms for CEs 5 & 6

30 Yakima Co:

1. Various methods for analyzing a storm event should be an appendix
2. p. 4-9 most of region 2 gets 8 not 12-16 inches/year precip. Map is too broad to be useful

32 Wenatchee UA:

1. Chapter 4 – No comment at this time. The local agencies await the results of further research. Steve King will keep us informed of further work.

33 Spokane Co:

1. Table 4-1.1: The meaning of “Note 1” in the Application column of the first SCS and SBUH model methods is unclear. What volumes have been predetermined based on the long-duration water quality storm? Suggest removing this note or rewording it to make it more understandable to the manual user.
2. Table 4-1.1: Application column: Suggest revising the second item listed in this cell to read “Common method for calculating peak flows for the design of drywells and conveyance systems.”
3. Section 4.1.2 Hydrologic Analysis Methods and Applicability, Page 4-1: The website given in the text box is no longer linked to the site indicated.
4. Section 4.1.3 Hydrologic Analysis for Core Element #5 – Runoff Treatment, Page 4-3: The Volume Based Treatment BMPs are still referred to as Preferred Methods and Alternate Methods; the methods need to be renamed to Method 1, Method 2...etc.
5. Page 4-3 First bullet: Section 6.8.3 does not have any look-up tables.
6. Page 4-3 Third bullet: Alternate Method 1: Change the second sentence to read: “This method is utilized in Spokane.” And add this sentence following it: “The method utilizes a bioinfiltration swale to treat the first ½ inch of runoff from the hydraulically connected PGIS area contributing to the treatment swale.
7. Page 4-4, Suggest upgrading the heading “Hydrologic Analysis for Core Element #6 – Flow Control” to subsection 4.1.4 similar to subsection 4.1.3, Hydrologic Analysis for Core Element #5 – Runoff Treatment, on page 4-3.
8. Page 2-26, should be the same in Chapter 4, but the Options are missing “Option No. 1.
9. Section 4.2.3 Storm Analysis, Page 4-10: Figure 4-2.7, Comparison of SCS Type II, Short Duration and Long Duration Storms, the lengths of rainfall durations and lag time are different: This Figure has no rainfall for less than a half an hour (versus 6 hrs in Figure 4-2.4), then 16.5 hrs of rainfall (versus 15 hrs in Figure 4-2.4), then a lag of 7.5 hrs with no rainfall (versus 15 hours in Figure 4-2.4), followed by 48 hrs of rainfall (versus 30 hrs in Figure 4-2.4). These two figures should not be in conflict.
10. Why are “typical” hydrographs and hyetographs given in Figure 4-2.3 and 4-2.4 and then all of the 6 month Water Quality Storms are given in Figure 4-2.5 (which are incorrectly referred to as “typical” as well).
11. It is cumbersome to switch from “hydrograph in one figure (4-2.3), then to “hyetograph” in another figure (4-2.4), then back to “hydrograph” in yet another figure (4-2.5), that all appear to be displaying rainfall distributions, not “storms.” Although the vertical axis units are different, since the graph data is similar from figure to figure, wouldn’t it be more straightforward to have them all hydrographs or all hyetographs?
12. Explain the vertical axis in Figure 4-2.4: fraction/30 minutes? Fraction of inches per 30 minutes?

13. Section 4.2.4 Precipitation Magnitude/Frequency Analysis, Page 4-25: the website given was inaccessible the days that we tried to visit it.
14. Section 4.2.7 Rain-on-Snow Design Storm, Page 4-28: The statement in the third paragraph that ‘adding inches of snowmelt (water equivalent) to the design recurrence interval storm should preserve the approximate probability of the design recurrence interval’ is an incorrect assumption. The design recurrence interval storm magnitude whether it be in the form of the “2-year precipitation depth” or a hydrograph that represents the rainfall distribution associated with a 2-year event, these magnitudes are going to vary depending upon the recurrence interval (i.e., 2 yr versus 100 yr). The amount of snowmelt proposed is a constant value. It would be a false assumption that adding the very same constant rainfall depth (water equivalent of snowfall accumulation) to the 2 year, 10 year etc. recurrence interval would result in “preserving the approximate probability of the design recurrence interval.” Some other numerical approach is warranted for the option to include a snowmelt factor into the design of a stormwater management facility.
15. Section 4.2.8 Using Hyetographs in Computer Models, Page 4-29: It is unclear what the following statement means: “When using the hyetographs in most computer models and the spreadsheet method, precipitation adjustments will automatically be made from....to....” Please clarify.
16. Section 4.3 Precipitation Maps, Page 4-29: The grayscale lines on the maps in Appendix 4B are difficult to read. Better resolution maps are needed in order to read the precipitation accurately.
17. Section 4.4.1 Introduction, Page 4-30: the equation (past mid-page) for calculating rainfall intensity is: $I = m / (Tc)^n$ where the time of concentration is raised to the “nth” power, not times “n.”
18. Section 4.4.2 Time of Concentration for Rational Method, Page 4-31 and 4-32: The last paragraph on Page 4-31 states, “The procedure described...is sensitive to...the size of the channel.” How does the equation for time of travel (which makes up the segments in the overall time of concentration) account for changes in channel geometry?
19. Section 4.5.2 Area, Page 4-35: The two paragraphs are saying the same thing: drainage basins with distinctly different runoff characteristics (i.e. forest versus a subdivision; and permeable versus impervious) need to have separate hydrographs computed and then recombining them for the total runoff hydrograph for the basin.
20. Section 4.5.3 Curve Number:
 - a) Page 4-37: Fifth paragraph needs to be clarified; an area of high groundwater or an area that has bedrock will not “cause a significant increase in runoff.” Both of these are subsurface features, whereas Curve Numbers are related only to surface characteristics. Curve numbers take into account the fact that a soil with predominately clay or bedrock has poor infiltration capacity and thus the Hydrologic Soil Group is typically “D”. Designing a drainage facility in an area that has high groundwater and/or bedrock can be very difficult, that is what should be emphasized.
 - b) Page 4-41: Bold print at the bottom of the page: Why are two adjustment factors (coefficients) necessary to bring the new storm data in-line with the old? It seems that with every adjustment that is made, another possible source of error is introduced and the accuracy of the custom storms is compromised.

- c) Page 4-42: In calculating the runoff volume using the PM2 Method: The example should actually give the individual unit conversion factors instead of a composite. The units (in) should be located underneath the variable that they represent. Instead of an upper case X to indicate multiplication, follow the same format as established in other parts of the Manual and on this page, simply use brackets (15)(Q)(A) to represent this operation; the X could be confused as another variable.
- 21. Section 4.6.1 Hydrograph Design Process – Sizing a Detention/Retention Facility, Page 4-53:..
 - a) Step 8 – Verify that the Steps noted are correct. It seems that it should be 2, 4, 5 & 7.
 - b) Step 10 – The last sentence should read: “The 2-year post-developed flows in this situation must be retained as dead storage that will ultimately infiltrate or evaporate.”
 - c) Step 11 – The legal implications of allowing concentrated discharge onto an adjacent property, where previously overland or sheet flow existed, should be verified.
 - d) Step 13 – A 1-inch diameter orifice is too small. The minimum diameter should be no smaller than 3 inches and should be on the order of 4 inches, if at all possible.
- 22. Section 4.6.1 Hydrograph Design Process – Sizing a Water Quality Treatment Facility: Step 4 – Use a subscript font for both the C_{sds} and C_{wqs} terms.
- 23. Section 4.6.3 Travel Time and Time of Concentration: Page 4-47: Sheet Flow: Use a subscript font for the friction term n_s , typical throughout Section.
- 24. Page 4-51: Open Channel Flow: Use a subscript font for the term k_c , typical.
- 25. Section 4.6.4 Hydrograph Synthesis: Page 4-53: Use a subscript font for the term d_t , typical.
- 26. Add a new Section 4.8 New Design Approaches (See Attachment “A”): As discussed in the Chapter 2 Comments, a process similar to Emerging Technologies (for stormwater treatment) needs to be in place for all other new methodologies that develop over time.

38 Ten Cities:

- 1. This chapter is difficult to read and use. If, as is stated in the introduction its purpose “... is to provide guidance for sizing (1) runoff treatment facilities... and (2) flow control facilities...” then it should be rewritten in a fashion to facilitate its use by system designers and owners. It is recommended that the chapter be rewritten/reorganized in such as fashion to present users with a decision tree that allows them to select most appropriate methods and designs based on site conditions. A user could then refer to a technical appendix that provides details on the various analyses and designs. Much of what is currently in the chapter would probably end up in this appendix. This approach could easily give a user several appropriate choices that they could then choose from. Part of this decision tree could include the user’s region.
- 2. We recommend that Ecology rewrite/reorganize chapter, move much of the technical information to appendices, and organize so chapter has a flow that users can use to choose analyses and designs. Recommend the use of flow charts to guide designers through the decision path that is recommended for developing design storm flows.

39 City of Spokane:

- 1. We have included limited comments on Chapter 4. Our understanding is that additional committee and consultant time will be devoted to document and further the work on the proposed regional storms and associated methodology. For that reason, we would appreciate the opportunity to make additional comments when that work has been completed.

2. If we are to use a sum larger than unity 1.00 in the referenced long-duration hyetographs, then these should be called "Modified Hyetographs." Preferably, we stay with a cumulative distribution sum of 1.00 and provide a multiplier to go from the 24-hour storm to the 72-hour storm.
3. A Table or Flow Chart for choosing the appropriate storm for a hydrologic analysis should be included. With references to short duration, long duration, 2yr-2hr, 2yr-24hr, 6mo-24hr, 10yr-24hr, 25yr-24hr, 72hr storms, etc. this can get confusing for the user. Please add some clarity.
4. 4.1.2 last paragraph "The chapter does not provide guidance for sizing..." Consider combining this paragraph with the Purpose Section leading off the Chapter.
5. 4.2.3 Short Duration Storm - The antecedent moisture condition from pre-developed to post-developed can vary dramatically (for example, non-irrigated field to irrigated lawns). We should make note of that and reference the later subsection on Antecedent Moisture Conditions.
6. 4.5.3 Curve Number - NRCS definition should be placed in the glossary under NRCS with reference to SCS. This occurs in locations before this without a clear definition.
7. 4.5.3 Curve Number - the new (proposed) NRCS Curve numbers will affect this section. This should be further reviewed on the second draft.
8. Appendix 4b - Precipitation Maps - these maps should be in color on the final draft for clarity. Are large-scale maps going to be available?

40 WSDOT:

1. Page 4-i: Table of Contents. Suggest that the four sample methods (4.4, 4.5, 4.6, & 4.7) be included as appendixes. This would shorten the chapter and if a user wants to review how a particular method is used or compared, they can go to that appendix.
2. Page 4-6: Feedback requested 4-1. Need further investigation into design storms and the rainfall/runoff relationship.
3. Page 4-10: Why select the short-duration storm at 3 hours if there is current information on 2-hour storms and the conversation between the 2- and 3-hour is only by the factor of 1.06? Is this worth that extra step considering all the built-in assumptions on everything else to derive the discharge rate or volume? The percent error in hydrology is much greater than the 6% increase in rainfall depth.
4. Pages 4-13 to 4-14: Figures are good graphical representations of the long duration storm for each region. Since they are all similar, use the one typical on page 4-12 and put the rest in the appendix with the report.
5. Pages 4-16 to 4-24: Should be moved into an appendix and referenced in the text where they are used to develop the Figure.
6. Page 4-27: Why is there a section on snowmelt give that the previous chapter questioned whether it should be included?
7. Last paragraph. This indicates the snowmelt should be considered in water quality design. It may include some pollutants, but it is no different or concentrated than what would come off under several storm events, it is just held in the snow longer and released over a longer period of time.
8. Page 4-28: 2nd paragraph. Should not assume that the entire daily snow on the ground will melt during the long duration storm. Normally it may take longer to melt depending on depth, density, water content, etc. Also, if the snow has been plowed, piled, disturbed, etc., then it becomes more compacted and melts at a slower rate.

9. Page 4-29: 4.3 Precipitation Maps. Only Figure 4-3.1 has been completed. I believe the Isopluvial Maps are under development. May want to include a note both here and in the appendix.
10. Page 4-35: Should state a maximum size of basin area for each method.
11. Page 4-38: Should have standard for describing existing conditions rather than using pre-settlement conditions.

Chapter 5 Flow Control Facilities

30 Yakima Co:

1. Stormwater facilities will not be effective with frozen orifices, so orifices need to be as large as possible. Also need a design to protect from debris.
2. Require only a percolation test, provided that consideration is given to conditions during test and allowance for long-term sedimentation.
3. 5.3.1 second paragraph. Insert “water quality based street cleaning “ after “typically” and define it. Include street cleaning or other pollutant loading reduction, not just treatment
4. Table 5.3.5 Infiltration rates need a dimension (per sq ft?)
5. Geo-textile selection is critical to long-term function of infiltration systems and is very commonly misunderstood: an incorrectly specified fabric will plug-up much faster than some native soils. Non-woven needle punched fabrics should not be used where sediment containing water may be present; woven fabrics with large percent opening should be used instead. The fabric used needs to be determined on a case-by-case basis.
6. Many times runoff will flow to a coarse sediment pre-settling manhole prior to being distributed to infiltration trenches. In this case it is possible to place a “shut-off” valve between the manhole and the trench array so that soil and groundwater can be protected during a spill. Consider showing details that include a shut-off valve. PVC or other solvent resistant plastic is recommended

32 Wenatchee UA:

1. 5.3.3, page 5-33: The presumptive infiltration rates are high considering the tendency for infiltration facilities to plug in the long term. We disagree with this presumptive approach. An in situ test at the proposed location of the BMP combined with knowledge of the soil classification and the bulk density of the material provides a more conservative and better estimate of soil infiltration capacity. Listing these presumptive rates puts the reviewer in a difficult situation in terms of disputing infiltration capacity with project proponents. The City of East Wenatchee standards allow maximum infiltration rates of 20 in/hr, which is then reduced by a safety factor to account for plugging. Furthermore, the rates provided in the table do not necessarily correspond to values provided in other literature such as the County soil surveys.

33 Spokane Co:

1. Section 5.2.1 BMP F 5.10 Detention Ponds, Figure 5.2.1, Page 5-8: This is a very good detail with the exception that it is out of focus; an example of better resolution would be helpful.
2. Page 5-11, *Maintenance*, Vegetation: This seems like an important maintenance element but it is not included in Appendix 5A Maintenance of Detention Ponds. Verify that all elements in the text are also included in the Appendix as well for consistency.

3. Page 5-11, Methods of Analysis, Detention Volume and Outflow: Text states that design must be in accordance with the “regulatory agency.” Is the regulatory agency Ecology or the local jurisdiction?
4. Page 5-12, Methods of Analysis, Emergency Overflow Spillway Capacity: Revise layout of variables for the broad-crested weir equation so that “runoff event (cfs)” is all on one line or at least centered under the text describing the variable.
5. The following figures in this chapter have the “Figure X.X.X Description” outside the box that encloses the figure. The Manual format is to have this information inside the detail box. Revise the following to match the rest of the Manual: 5.2.4, 5.2.6, 5.2.7, 5.2.10 through 5.2.13.
6. Section 5.2.4 Control Structures, Page 5-21: *5-1 Feedback requested:* The appropriate size for an orifice should depend upon the expected head in the pond. For example, the following orifices operate very well under the given conditions:

control structure	pond head
outlet pipe	very low
v-notch weir	low
slotted weir	moderate
multi-stage orifice	high

It should be noted that slots are intended to extend the full height of the outflow structure. If slots are utilized in this manner they can be as small as ½ inch in width. As for the minimum size of a typical circular orifice, they should be no smaller than 3-4 inches; anything smaller becomes a maintenance problem that will need constant attention to keep clear and operating properly.

7. Section 5.3 Infiltration of Stormwater for Quantity Control, Page 5-29: All references to “basin” need to be changed to “pond” in order to maintain the distinction between a contributing drainage basin area and a stormwater storage facility.
8. Section 5.3.2 Applications, Page 5-29: Text states that runoff in excess of the infiltration capacity must be detained and released in compliance with...the “regulatory agency.” Is the regulatory agency Ecology or the local jurisdiction?
9. Box at the top of Page 5-30 says “should” when it needs to say “must.”
10. All of Appendix 5B should be moved forward into SSC 1 as all of the information is applicable. It appears that the draft Appendix 5B was extracted from Spokane County’s Appendix I (Guidelines for Stormwater Management). See the entire appendix (Available for download at the E WA Stormwater Project ftp site).
11. Chapter 6 also has a SSC that discusses “Depth to Limiting Layer.” This and all of the SSC for Chapter 5 and 6 should be coordinated so that the wording is the same.
12. Section 5.3.3 Determination of Infiltration Rates, Page 5-32:
 - a) This manual should not only refer to design procedures in the City of Spokane and Spokane County.
 - b) In addition, there should not be “preliminary” infiltrative rates in this manual as discussed at the Manual Subcommittee level since data printed in a guidance manual takes on a life of its own; preliminary and/or experimental data has no place in a technical manual.
 - c) Jim Harakas of GeoEngineers told the Manual Subcommittee that the table he put together was for the purpose of showing us “where the idea of a matrix was going;” and not intended for publication as is. It would be fine to mention that Spokane is

currently performing (or are preparing to perform) testing in our area that will be the start of the work that needs to be done in order to develop a matrix such as this. Other areas in eastern Washington should also participate. It seems reasonable that in order to present this type of information for publication, the data needs to be sampled from all of eastern Washington, not just one isolated area. The text for this section should emphasize that in-place permeability testing and full-scale drywell tests (for example) will continue to be the proper infiltration-determination procedure until the matrix is completed. Our methods for establishing infiltration rates are attached (Appendix I of Spokane County's Guidelines for Stormwater Management is available for downloading from the E WA Stormwater Project ftp site).

- d) When the table is finalized, a footnote needs to be added that lets the designer know that a safety factor has already been applied to the infiltrative rates shown in the table. The Safety Factor should be stated and if it happens to differ from soil to soil, all of them should be listed; design engineers should have the option to increase the Safety Factor if site conditions warrant.
13. Section 5.3.4 General Design, Maintenance...Page 5-34: Second paragraph under Design Criteria-Sizing Facilities:
- a) Reword first sentence to read: "Infiltration facilities are sized according to the methods described in Chapter 4."
 - b) Text states that overflow from an infiltration facility must comply with the requirements of the "regulatory agency."
 - c) Is the regulatory agency Ecology or the local jurisdiction? Third bullet under Additional Design Criteria: We know of no "common requirement to store the 10-year design storm below the surface in drywells." Spokane's use of drywells is purely for rate control, not for volume. This statement should be revised to only refer to infiltrative trenches, if in fact that is a common requirement of that particular infiltrative design.
14. Section 5.3.5 BMP F 5.20 Drywells, Page 5-35:
- a) Third paragraph (statement) under Design Criteria for Infiltration Drywells states that drywells have a depth of approximately 5 ft. For a Type A drywell (single depth, as shown in Figure 5.3.2) the depth from ground surface to bottom of barrel is over 8 ft; for a Type B drywell (double depth, as shown in Figures 5.3.1 and 5.3.2), the overall depth is over 12 ft. Revise the dimensions in the text.
 - b) Third paragraph from bottom of page says that drywells should be wrapped in filter fabric. Based on recent experience Spokane County plans to change this standard by removing the filter fabric from around the drywell barrel. Suggest this be deleted from this manual also.
 - c) Fifth paragraph (statement) under Design Criteria for Infiltration Drywells states that spacing between drywells should be a minimum of 20 ft. Spokane County requires a minimum separation of 30 ft from center to center. For typical excavated sideslopes of 1.5:1 (H:V), two Type A (single depth) drywells excavated side by side would have the ground-level circumference overlapping about 1 ft, even at 30 ft separation. For two Type B (double depth) drywells, approximately 13 ft of overlap occurs in the upper circumference of the gravel backfill. In tighter soils, a steeper slope can be achieved inside the excavated hole, but for the better infiltrative soils (predominately

sands/gravels), the excavated hole could be 3:1 or flatter. Thus, the 30 ft separation should be the minimum.

- d) Sixth paragraph (statement) under Design Criteria for Infiltration Drywells states in the first sentence that “drywells should not be built on slopes greater than 25% (4:1).” The next sentence states that “drywells may not be placed on or above a landslide hazard area or slopes greater than 15% without evaluation by a professional engineer with geotechnical expertise...” These two statements seem to be saying the same thing, but at different slopes. This criterion should be revised to state that any drywell proposed to be placed on a slope of 15% or greater, needs a geotechnical report prepared by a qualified geotechnical engineer that includes a recommendation to do so. Further, the language can state separately that drywells cannot be placed in a landslide area or in highly erodible soils. These two items (slope and soil stability) seem to need separate clarification.
 - e) There does not appear to be any reference to water quality storm, or Chapter 4, or what outflow rates can be expected for a drywell. Information must be provided that instructs the designer as to how to use a drywell in a drainage facility design.
15. Section 5.3.6 BMP F 5.21 Infiltration Basins Ponds, Page 5-39:
- a) How would the designer know how to size a drainage facility that utilized an infiltration pond? Information must be provided that instructs the designer as to how to use this BMP in a drainage facility design.
 - b) Figure 5.3.4, Page 5-40: Keep the word “Pond” in the description and remove “Basin.”
16. Section 5.3.7 BMP F 5.22 Infiltration Trenches, Page 5-41: What design infiltration rate should be expected (or tested or designed for)? Where is the information on how to design an Infiltration Trench? Figure 5.3.6, Page 5-42: Show the WSE on the Elevation view of the detail.
17. Section 5.4 Evaporation Ponds, Page 5-47:
- a) Second paragraph below variables: A two-year cycle is required for evaporation pond sizing not “to account for seasonal variations in precipitation rates and evaporation rates.” The spreadsheet is established as a one-year cycle that is simply repeated; i.e. the precipitation rates change with each month, but not from year to year; same for the evaporation rates. The reason for the two-year cycle is because if the design condition requires that the cycle begin with the 100-year storm as dead storage in the pond, many times that initial amount does not allow the system to reach equilibrium until a second cycle. While the pond (in some circumstances) may never go dry (theoretically), the designer knows that the system has reached a steady-state when the month in which the total volume stored in the pond is reduced in the same month one year later; this indicates a trend toward volume reduction and it is assumed that the pond’s capacity is adequate.
 - b) The directions given in this section do not provide enough information for a designer to size an evaporation pond. Steps should be given (like those established for pond sizing, for example) that explain how to set up the spreadsheet, etc.
 - c) Liner specifications need to be specified. The minimum seepage allowed from an evaporative pond in Spokane County is 1×10^{-7} cm/s.
18. Section 5.4.1 Runoff Volume Determination, Page 5-48:

- a) First paragraph, last sentence: Is the “local approval authority” Ecology or the local jurisdiction?
 - b) Third paragraph, last sentence: Since the only reduction allowed in the runoff analysis (interception, initial abstraction, etc.) is already accounted for in the SCS Curve Number Method, why mention it? Only mention reductions that are in addition to what’s accounted for; it makes no sense to offer something that isn’t available.
 - c) The information provided in this Section is not enough for a designer to determine how to size this type of drainage facility. Expand this Section or refer the designer to the local jurisdiction.
19. Section 5.4.2 Other Design Considerations, Page 5-49:
- a) Second paragraph needs to be revised to: “The design of the evaporative pond facility will need to evaluate the potential of for groundwater seeping into the pond from the surrounding area for an unlined pond and evaluate the potential for groundwater mounding for a lined pond. In Spokane County, most of the time, evaporative ponds are lined to keep groundwater seepage from entering the pond and to protect downstream properties. And when the proximity to groundwater is close, there is a potential for mounding under the pond, creating a buoyant affect, which could damage the liner and/or cause the pond to breach.
 - b) Last paragraph (regarding snow removal operations) should also be included in Appendix 5A under Maintenance for Evaporation Ponds.”
20. Section 5.5.1 BMP F 5.40 Concentrated Flow Dispersion, Page 5-49:
- a) Could the reference to “other pavement” in the first sentence include rural County roads or parking lots?
 - b) Could this BMP still satisfy Core Element #5 (Treatment) and #6 (Flow Control) ?

36 ACEC Spokane:

- 1. p. 5-32 just above info for reviewers, change “for information purposes only” to “in Table 6.4.1.”
- 2. p. 5-33 Replace table 5.3.5 with revised table
- 3. p. 5-39 add at end of third bullet: “See Table 6.4.1 for design infiltration rates.”
- 4. p. 5-46 Unstable excavation sites: change to sides.
- 5. p. 5-44 Geotextile fabric liner: insert “non-woven” into “engineering geotextile material.”
- 6. p. 5-42 and 43 indicate “non-woven” filter fabric in all four figures (p. 5-43 line sides and protective layer)
- 7. p. 5-43 change “clean stone” to “washed stone”

38 Ten Cities:

- 1. The tacit assumption in reading the manual seems to be that runoff from storms in eastern Washington directly, and negatively impacts streams. Thus the emphasis in the first part of Ch 5 on detention and retention structures. This emphasis though, may be misplaced. The construction of such structures in an arid to semi-arid climate could easily be detrimental to long term watershed health as it will promote evaporative loss of rainfall runoff when that runoff could be more beneficial to a watershed by allowing it to infiltrate into the ground and eventually recharge groundwater (and later yet surface water). The reality for much of eastern Washington is that the climate dictates that as much rainfall runoff as possible be captured for infiltration to maintain aquifer and watershed health. Reorganize Chapter 5 to emphasize infiltration of run off as a

preferred option where that run off will not negatively impact groundwater quality. Place material in section 5.3, Infiltration before the other design options.

2. Soil/subsurface moisture content is an important component to any calculation of infiltration capacity/quantity in arid and semi-arid environments. In fact, highly porous or permeable materials may not easily transmit water under unsaturated conditions. This concept generally does not seem to be evident in much of these chapters.
3. At a minimum, soil/subsurface moisture conditions need to be factored into susceptibility assessments and runoff loading calculations/estimates. This could be done in some sort of rainfall/infiltration component in aquifer susceptibility ratings.
4. Should runoff quality be addressed before runoff quantity (Ch 5)? Whether or not runoff is polluted needs to be considered before structures are designed for retention, disposal, infiltration, etc. This conceptual approach would seem to be more in line with how a manual user would design a system. We suggest that Chapters 5 and 6 be reordered.
5. p. 5-6 High water intake trees such as hybrid poplars and cottonwoods provide an option in reducing contaminant loads in water infiltrating into the ground from basins, ponds, ditches, etc. As written currently, many of the design criteria seem to preclude the beneficial use of such plants. Acknowledge the use of such plants in mitigating the impacts of certain pollutants and provide for their use in water conveyance or retention structure designs.
6. p. 5-33 Reviewers are requested to provide information regarding infiltration rates for soil types common to their area and for the types of infiltration facilities used for on-site stormwater disposal in their locale. Methods for establishing design infiltration rates are also requested from reviewers. The presumptive rates shown in Table 3.3.5 will be modified in the final version of the manual based on information from the reviewers. Kennedy/Jenks is analyzing this information for the City of Pasco and will provide this information to Ecology at a later date.
7. p. 5-33 Many drywells extend below the ground surface into native geologic materials, including indurated deposits. Table should also incorporate compatible geologic materials terminology

39 City of Spokane:

1. This Chapter might be better titled "Flow Control - Detention, Retention and Infiltration"
2. Maintenance of Control Structures - Metal Grates, we design our grates for the condition of being half blocked vs. 20%.
3. The City review group has generally agreed that some of Chapter 5 and much of Chapter 6 could be condensed. We appreciate the simple reference such as on Pages 5-14, where the reader is referred back to 5.2.1 for access road specifics.
4. Where did we get the numbering system for the BMP's?
5. Maintenance Requirements - This may be helpful info, but how are we going to pay for all of this?
6. 5-1 Feedback Requested - Freezing has generally not been a problem below the frost line (3 feet, more or less) and we have sufficient distance on the outlet pipe. If we propose to use orifices with less than the 1-inch diameter, the designer should provide additional trash control. Bottom line: 1/2 inch.
7. 5.2.1 Right-of-Way - This could be eliminated from the chapter. First, it is unlikely that an additional right-of-way take would be the answer. And second, the access may be by either easement or tract with the width determined by the terrain.

8. 5.2.1 Landscaping - The information provided in this section seems excessive when we are dealing with stormwater, such as "...blow down trees". This might be an area where we simply say to consult with your local landscape architect and/or arborist as to what, where, and how to plant.
9. 5.2.1 Sediment - Regular testing of sediment as discussed is unlikely to occur given the budget most of us have to operate within. So where does this leave us? This might better be written that where higher levels of contaminants are found to exist, there may be additional responsibilities for disposal.
10. 5.2.1 Overflow Spillway Capacity - L is discussed as both the length of the weir and width of the weir. Let's be consistent.
11. 5.2.2 General - What is the reason for a 36 inch minimum pipe diameter?
12. 5.2.2 General - the Note after Item 4 is unclear. Reword.
13. 5.2.2 Structural Stability - Need to be more general, such as, "Tanks must meet loading criteria as appropriate for the site."
14. 5.2.2 Access - Why a maximum of 20 feet? Also, we should make reference to confined space requirements.
15. 5.2.4 Access - Reference to OSHA should be changed to WISHA or refer to both OSHA and WISHA. Also, eliminate reference to confined space signs. So, number 3 should read, "Manholes, catch-basins and vaults must meet the WISHA confined space requirements."
16. 5.2.4 Maintenance - If we are aware of problem structures, it may be appropriate to clean structures twice yearly. Otherwise, we are not funded adequately to provide cleaning more than once yearly.
17. 5.3.1 Description - We should note that groundwater quality standards shall be determined at the top of the aquifer.
18. 5.3.1 Description - 2nd paragraph, "Typically, ...", does this mean all cases or most?
19. 5.3.2 Applications - 2nd paragraph, change and to or "...water quality design storm or where runoff is treated prior to discharge."
20. 5.3.4 General Design, Maintenance, and ... - 3rd bullet, where is this a common requirement and why?
21. 5.3.4 General Design, Maintenance, and ... - last bullet, change to "During the initial operation, verification testing is recommended."
22. 5.3.5 BMP F 5.20 Drywells - 6th paragraph, should read "Filter fabric (geotextile) should be placed to prevent the migration of fines into the drain rock."
23. 5.3.5 BMP F 5.20 Drywells - 7th paragraph, should read, " Drywells should be no closer than 20 feet center to center or twice the depth in free flowing soils, whichever is greater."
24. 5.3.5 Maintenance Criteria for Drywells - should we refer to "...from the drywell grate..." rather than "...over the drywell..."?
25. 5.3.6 BMP F 5.21 Infiltration Basins - 6th bullet, what about cattails?

40 WSDOT:

1. General comment. In most parts of the dry, arid areas of eastern Washington, infiltration will be the most effective and used facility. Some surface detention facilities may be used to meter out and control flow so as not to cause erosion, however, WSDOT does not expect to see underground facilities used, if at all, but including them does provide options. Retention facilities would probably be rare or not used at all because of the

limited amount of water able to be kept in the facility, it will evaporate between rain events.

2. Page 5-3: Dam safety is only required for 10 acre-feet of storage above natural ground.
3. Page 5-21: Feedback requested 5-1. The minimum size orifice should be one inch. Anything smaller will plug causing the system to not function as designed. Small orifice sizes will probably not work in most all situations, especially above ground, during the winter due to freezing. However, those installed underground in facilities would likely have less of a freezing problem due to the warmer air and water temperatures underground and in enclosed systems. A down turned pipe would probably work as long as it is below the water surface and ice layer. (See Figure 5.2.10, page 5-26)
4. Page 5-29: Section 5.3. Need to differentiate between subsurface and surface infiltration. The Description (Section 5.3.1) and the first two paragraphs of the Applications (Section 5.3.2) are confusing.
5. Page 5-30: SSC-1, second bullet. WSDOT disagrees that additional setbacks are necessary. WSDOT has designed infiltration facilities with the cooperation and input of the Department of Health and have consistently used the 100-foot setback mentioned in the first bullet.
6. Page 5-31: SSC-4. Add “for the 25-year design event.”
7. Page 5-32: Section 5.3.3. Differentiate between subsurface and surface infiltration determination.
8. Page 5-33: Feedback requested 5-2. The current WSDOT testing procedure for infiltration rates uses the D10 analysis as stated in Ecology’s Stormwater Management Manual for Western Washington. The D10 analysis should be considered a valid method for testing surface infiltration.
9. Infiltration is our best friend for reducing runoff in Eastern WA. The highly permeable soils can handle even most high intensity thunderstorms with minimal runoff and most long duration storms. It is the rain on snow or frozen ground that causes the major problems because the soils ability to infiltrate is blocked. Then the problem becomes a flooding concern.
10. Page 5-33: Add “subsurface” to the title of Table 5.3.5.
11. Page 5-34: Section 5.3.4. Confusing because lack of clarification between subsurface and surface infiltration. Where is it a common practice to store the 10-year design storm below the surface in the drywell? WSDOT has never done this.
12. Page 5-35: 5.3.5 Drywells. – Drywells are an acceptable method of getting rid of stormwater by infiltration especially in the urban environment in most situations due to the porous soils. WSDOT concurs that they could cause other problems with shallow water tables and sole source aquifers, but if these situations are not present then they should be an acceptable stormwater treatment system.
13. Page 5-35: Maintenance Criteria. Maintenance every 6 months is not a reasonable expectation.
14. Page 5-39: Section 5.3.6. How is the infiltration rate established? WSDOT would not use 72 inches/hour per Table 5.3.5. In the maintenance criteria, dense turf is not really possible in eastern Washington and mowing is not usually done.
15. Page 5-49: Section 5.5. Need to expand this BMP to include roads and highways. This is an important BMP that needs further investigation and work. Credit should also be given for partial use of this BMP even if the criteria are not totally met. Natural

dispersion of water by sheet flow should be the first option and encouraged by agencies in handling and treating stormwater. This method will mimic the natural condition. This section should be moved to the front of this chapter and expanded to discuss its advantages and benefits.

16. Page 5-50: Design Guidelines. Slope criteria should increased to 17% (6:1 side slope is 16.7%) at a minimum and preferable higher. Should be able to justify steeper slopes by an analysis and/or application of some criteria such as bullet.
17. Page 5-52: Section 5.5.2. Why are roadways not listed as a candidate for sheet flow dispersion? Design guidance should be developed to analyze all natural and landscaped areas where sheet flow exists or can be developed. WSDOT would like to see a section on design guidelines for sheet flow natural dispersion from roadways.

Chapter 6 Runoff Treatment Facilities

28 Gary Minton:

1. Sand filter size has no effect on performance; project proponents may overstate benefits if increasing area
2. Sand filters unlikely to remove dissolved phosphorus
3. Table 6.11.1 Dissolved metals removal is not the same as total metals removal cited in original source (King Co.). Swales, strips, and wet vaults will not remove dissolved metals. Media filters, wet ponds, and constructed wetlands have the best potential to remove dissolved metals.
4. Page 6-84 Dubious treatment benefit of second box
5. Swales should not precede filters due to erosion potential.

30 Yakima Co:

1. Please refer to “Arid and Cold Climate BMPs” document provided.
2. Water quality street cleaning programs should be equivalent to on-site runoff treatment and added to the manual as a BMP. The description of proper use should include methods, equipment, and frequencies.
3. Acceptance of new and emerging technologies should be based on science not cost; BMPs based on sound scientific theory or for research projects should be given experimental approval without prior data collection. Results and data must be reviewed for final BMP approval.
4. Should be called “Controls” not “Treatment” to allow for street sweeping and infiltration
5. p. 6-71 manifold pipe should be identified in text and plan view as perforated pipe
6. Treatment train needs technical review, esp. for dissolved metals removal. Is it worth cost? Are other controls (sweeping, source control, operational changes) more effective?
7. Oil/water separators and other devices that collect material and require specific maintenance actions should be greatly discouraged and only used in special instances where maintenance is ensured

32 Wenatchee UA:

1. 6.2.1, page 6-5: In step 2, Ecology encourages an off-site analysis of water quality. What level of off-site analysis is expected? Water quality testing? General categorization of receiving water?
2. 6.4.2, page 6-25: SSC-7 requires assessment of performance in terms of water quality. What level of assessment is required? Water quality testing is very costly.
3. Chapter 6 – The manual should encourage the use of landscaping areas for BMPs.

33 Spokane Co:

1. There are several different ways to go through the BMP selection process: the tables and the text (steps, etc.). All of the many tools given for selecting the proper BMPs do not correlate to one-another. This chapter needs to revision to clarify the process of selecting treatment BMPs.
2. It is incorrectly stated that Alternative Design Method 1 matches Spokane County's method.
3. Multiple "treatment trains" are required for "High ADT" intersections. There have been no estimates of costs associated with this level of treatment, and no consideration given to whether or not there is room in a typical ROW to implement more than one type of treatment.
4. Several of the treatment BMPs are not suitable for cold weather climate. The Manual does not provide recommendations for amending the BMPs to work in cold weather/frozen ground conditions.
5. Section 6.1.2 Runoff Treatment Facilities, Page 6-2:
 - a) Under the "Performance Goals" header, the stated treatment goal is "about 90-95%." This goal should match the treatment goal stated at the bottom of Page 1-13, which is 90%.
 - b) Under the "Basic Treatment Facilities" sub-heading, individual pollutant removal goals are not necessary - this is a "presumptive" manual: when the BMPs in the Manual are employed, then it is presumed that the pollutant removal and/or treatment goal has been met. The following phrase in this paragraph implies that monitoring may be necessary: "For influent concentrations greater than 200 mg/l, a higher treatment goal may be appropriate." Since the Manual is presumptive, we recommend that the implied monitoring requirements be deleted.
 - c) The order of the facility types needs to be rearranged so that all three places in the Manual match: Figure 6.2.1, Section 6.1.2 under Performance Goals and Section 6.2.1, the Step by Step selection process; one starts with Basic Treatment and the other two end with Basic Treatment.
 - d) Under the "Metals Treatment" sub-heading, it says that there isn't enough data to support a removal efficiency goal. Several "Basic Treatment" BMPs are suggested for Metals Treatment in Section 6.11. Given these two facts, there is no proof that "Basic Treatment" isn't enough already. Therefore, the requirement to provide "Metals Treatment" should be eliminated.
6. Section 6.2.1 Step by Step Selection for Treatment Facilities, Page 6-3:
 - a) Remove the duplicate shorter version set of "steps;" the brief summary of each step, immediately followed by the lengthy, detailed steps is unnecessary and confusing.
 - b) Remove the italicized instructions that direct the reader to go to the next step; the instructions are inconsistent and never suggest that you could skip a step, so it should be obvious that the reader needs to go on to the next step.
 - c) Step 1:
 - 1) Remove "Infiltration Facilities" from the header; the step is supposed to be observing the existing, natural conditions. If a constructed man-made facility exists as part of the existing site, this could designate the site as redevelopment, which is not the purpose of this chapter.

- 2) The first sentence, “Check the infiltration treatment design criteria in Section 6.4 of this chapter,” does not belong in this section. This misdirects the reader to investigate the types of treatment, which for this step, is completely unrelated. If the objective is to determine whether “the site discharges to ground or groundwater, or surface waters, or both,” then provide guidance for determining if it does or does not.
- 3) Based upon the information given in Step 1, the reader could not have made a decision about whether the discharge from the site was to ground or groundwater, etc. The instructions need to better explain the reader how to make that decision.
- d) Step 2:
 - 1) This step is asking two separate questions at once: 1) determine the receiving waters, if any; and, 2) determine the pollutants of concern. These should be two separate steps as they are unrelated.
 - 2) Based upon the information given in Step 2, the reader could not have made a decision about the receiving waters or the pollutants of concern. The instructions need to better explain the reader how to make that decision.
- e) Step 3:
 - 1) A list of the high-use sites should be listed right here; the reader should not have to flip back to Chapter 2 to find the list.
 - 2) This step is supposed to help the reader to determine if an oil control facility is required. If so, why does the text immediately tell the reader how to apply oil control? This step needs to tell the reader what criteria help pinpoint if oil control is necessary.
 - 3) The “Note” under oil control options needs to give a list of the land uses referred to as possibly requiring spill control.
 - 4) After the bullets under the “Note,” the first sentence refers the reader to General Requirements in “Section 4” – there is no “Section 4.”
 - 5) The bold print at the end of this step says to proceed to Step 4 regardless of which choice you make, thus it is not necessary and only confuses the reader that there may be somewhere else they should be going other than to the next step.
 - 6) Based upon the information given in Step 3, the reader could not have made a decision about whether an oil control facility was needed. The instructions need to better explain the reader how to make that decision.
- f) Step 4: Based upon the information given in Step 4, the reader could not have made a decision about whether pollutant removal via infiltration and collection is feasible. No decision or determination was made before proceeding to the next Step. The instructions need to better explain the reader how to make that decision.
- g) Step 5: The language in this Step gives the background behind “why” it is required and then immediately (last paragraph on Page 6-7) jumps to, “If phosphorus control is required, select and apply treatment.” No decision or determination was made before this statement is made. Based upon the information given in Step 5, the reader could not have made a decision about whether the control of phosphorus is required. The instructions need to better explain the reader how to make that decision.
- h) Step 6:
 - 1) The language in this Step is the closest to achieving the desired result: assisting the reader as to how to make the decision if treatment is necessary.

- 2) Revise the second sentence as follows: Areas of arterials and highways, multifamily, industrial and commercial project sites that do not discharge to fish bearing streams or lakes are not subject to Metals Treatment Requirements.
- i) Step 7: The last sentence of this Step says that the reader has completed the treatment facility selection process. This is not true because continued in Section 6.2.2, there are three more pages of text describing “Other Treatment Facility Selection Factors,” followed by Section 6.2.3, “Other Physical Factors,” which is an additional four pages of selection criteria to consider. The reader will quit at the end of Step 7 unless this statement is revised. A reference to Sections 6.2.2. and 6.2.3 needs to be provided in the steps so the reader can incorporate them in the treatment facility selection process.
7. Section 6.2 Treatment Facility Selection Process, Figure 6.2.1, BMP Selection Process, Page 6-10:
 - a) Left side of flow chart: If you say “No” to “Determine if Site Discharges to Subsurface Infiltration System,” then for the last step, Why would you “Apply Infiltration Treatment” ?
 - b) If you “Apply Infiltration Treatment” are you done? Or do you still need to “Apply a Basic Treatment Facility” ? If so, flow chart needs another arrow; if not, flow chart needs an explanation as to why project does not need basic treatment.
 - c) If you follow the flow chart and say “Yes” to Step 4, you rule out infiltration altogether. Most of the Metals Treatment BMPs involve infiltration, so how does this work? You only proceed to the Metals Treatment “box” if you have said “No” to infiltration.
 - d) Right side of flow chart: Metals Treatment facilities do not match those in Table 6.2.2; these two should match. The table indicates that a constructed wetland is one of the best solutions for metals treatment, however this choice is not offered on the flow chart, nor is this BMP included in this Manual.
 - e) Several of the treatment facility options (any of the sand filter options) for phosphorus and metals treatment are not recommended (Section 6.8.4 Site Suitability, second bullet) for regions with climates such as that found in Eastern Washington. Provide specific recommendations as to how to “make” these options function properly in Eastern Washington or take them out of the Manual.
8. Section 6.2 Treatment Facility Selection Process, Figure 6.2.2, BMP Selection Process, Page 6-11: Are all of the Treatment BMPs in the flow chart equivalent? The order of the list should be from the most common to Emerging Technologies. Catch Basin Inserts are an Emerging Technologies and should be referenced as such, just like they are in the Oil Control Facility box of Figure 6.2.2.
9. Section 6.2.2 Other Treatment Facility Selection Factors, Page 6-12:
 - a) Text discusses physical factors first, followed by pollutants of concerns; the order of the sub-headings should follow the text: revise one to match the other.
 - b) All of the information under the sub-heading “Pollutants of Concern” has been covered in previous areas. There is nothing in this particular paragraph that adds to what is already known.
 - c) Last paragraph under “Cold Weather Considerations” says, “The designer should consult with the local plan authority before making a final decision on the inclusion of cold weather measures.” A local plan authority should not make the decision with regard to this matter, otherwise, the effect from site to site will vary widely due to the

- bias of the individual making the decision. This suggestion (allowing local governments to change the BMPs) is in direct opposition to Section 1.1, Page 1-2 that outlines the difference between the ‘presumptive’ and ‘demonstrative’ approach. If the designer is required to modify a BMP in an attempt to mitigate the affects of cold weather, then how does he demonstrate that “the alternative approach is equally or more protective of water quality, as is required in Section 1.1?”
- d) Same paragraph, same sentence: What ‘cold weather measures’ have been established in this section? Only the cold weather ‘problems’ have been listed and discussed; protective or preventative measures are not included.
 - e) Figure 6.2.3, Page 6-15: A review of this figure indicates that the all of Eastern Washington is considered a “Cold Weather Area,” defined as “especially vulnerable to the effects of cold weather.” Eastern Washington is an established cold weather region and this Manual recommends BMPs despite the stated fact that they will not function properly. This Manual presents no solutions to the limitations of the BMPs.
10. Section 6.2.3 Other Physical Factors, Page 6-15:
- a) King County design procedure (Chapter 10 – Urban Water Quality) for biofiltration swales says that the slope needs to be less than 4%; this says 6%, Page 6-31 says 5%. Verify the correct maximum design slope and ensure that the slope is the same in all places in the text that it is mentioned. Also, site the source.
 - b) If the design criterion is less than 4-6%, then delete the last sentence; a biofiltration swale should not be place in 15% slopes.
 - c) Third bullet should be revised to “Depth to Limiting Layer” (delete bedrock/hardpan/till)
 - d) Third bullet, first sentence should be revised to, “The downward exfiltration of stormwater can be impeded by many different types of impervious limiting layers, including by not limited to: bedrock, hardpan, till, or clay.”
11. Table 6.2.1, Page 6-16:
- a) The heading for this table still does not match the information in the table.
 - b) Vents and Emissions (under Roofs) is an air quality constraint and has nothing to do with the management of stormwater runoff.
 - c) Footnote in italics under the table implies that treatment may not be necessary if source controls are implemented. This is in conflict with the statement on Page 1-13 that states, “...some combination of source control and treatment will always be needed.” One of these two statements needs to be revised to match the other for consistency.
12. Table 6.2.2, Page 6-17: It seems unclear what is meant by significant processes and lesser processes.
13. Table 6.2.3, Page 6-17: Constructed Wetlands and Sand Filters should have columns on this chart.
14. Table 6.2.4, Page 6-18:
- a) The table needs to be more complete and have better explanations in the table or by footnote to make sure that it is addressed elsewhere.
 - b) This table should have the option of using grasses other than dryland grass if an irrigation system is provided for areas with less than 16 in. of rainfall.
 - c) Sand Filters: Preferred Option(s) for Semi-Arid Watersheds; there is nothing in the box.

- d) Extended detention dry ponds: Preferred Option(s) for Semi-Arid Watersheds; says to use “dry or wet” forebay. These are completely opposite, how can they be equivalent? And if doesn’t matter whether it is dry or wet, then why mention it? What other option is there?
 - e) Infiltration: Preferred Option(s) for Semi-Arid Watersheds; Clarify when and why to limit pervious area treatment (Pervious areas should not require treatment). Clarify what multiple pretreatment is and when is needed.
15. Section 6.3 General Requirements for Stormwater Facilities, Page 6-19:
- a) Delete first bullet under “Summary of Areas Needing Treatment” regarding treatment of runoff from lawn and landscaped areas. While there may be a small percentage of fertilizer on a residential or commercial lawn, the amount of runoff contributed to the treatment facility is insignificant in comparison to the amount contributed from impervious surfaces.
 - b) Delete fifth bullet under “Summary of Areas Needing Treatment” regarding treatment of runoff from non-pollution generating surfaces that eventually reach a stormwater facility. This criterion needs to be eliminated because it is always assumed that runoff from the entire basin will reach the treatment facility: the treatment area is one facet of the facility, and discharge to an infiltrative structure that occurs after treatment, is expected. The outflow structure is designed to accommodate the stormwater volume generated by the remaining impervious and permeable surfaces within the drainage basin.
16. Section 6.3.2 Sequence of Facilities, Page 6-20: This section needs to be reworded. The text discusses location of facilities as upstream or downstream, and it is very confusing to follow the direction of this paragraph.
17. Section 6.3.3 Side Slopes and Embankments, Page 6-21: Specify the wall height when a retaining wall analysis is required.
18. Section 6.4.1 Purpose, Page 6-21: The word “basin” should only be used when referring to a drainage basin or watershed, not as a structure. The word pond or swale should be utilized to distinguish the difference. This comment is typical for all of this section.
19. Section 6.4.3 General Considerations for Infiltration and Bio-infiltration Facilities:
- a) Page 6-22, 6-2 Feedback Requested: No Comment.
 - b) Page 6-23, second paragraph below “Site Suitability Criteria:” Is this applicable when a site does not meet all 7 SSC? Or does it imply that a geotechnical report is always required? Page 6-24, SSC-3 Soil Infiltration Rate/Drawdown Time: Is it presumed that Hydrologic Soil Groups B and C will equate to an infiltration rate of 2.4 in/hour or less? Or does this criterion imply that post-construction testing must be done to verify this rate?
 - c) Page 6-25, SSC-5 Soil Physical and Chemical Suitability for Treatment: first bullet seems to imply that CEC testing is required for any soil that isn’t a “loamy sand.” Spokane County has several “pre-approved” soils for use in treatment swales that have designations other than “loamy sand;” the soils have been CEC tested for compliance, i.e. the pre-approved soils are presumed to meet the CEC criteria for treatment.
 - d) Page 6-25, SSC-5, third bullet: The organic content of a soil cannot be determined without testing. Is the determination of the organic content required? Or can it be presumed from soils that meet the minimum CEC? Is this why ASTM D2974 is specified?
 - e) Page 6-25, SSC-6 Seepage Analysis and Control: This sentence could imply that an off-site/downstream analysis is required with every design submittal that includes infiltration. If this is the intention, the Manual needs to outline the steps necessary to meet this SSC. If not, the Manual needs to specify when an analysis is needed.
 - f) Page 6-26, Sizing Criteria: How does the 2.4 in/hr (or less) infiltrative rate found in SSC-3 correlate to the requirement that the Water Quality Design Storm Volume must be infiltrated within 72 hours after the cessation of flow? In addition, SSC 3 says that the pond must be empty 24 hours after completion of inflow. SSC 7 says the size is “based on the requirement

- of infiltrating the Water Quality Design Storm Volume within 72 hours after cessation of flow.” Which is correct?
- g) Is the SSC a checklist or a formal report that must be submitted as part of the review package? Are these guidelines or does the designer have to prove that all of the SSCs have been satisfied prior to proposing an infiltrative system?
20. Section 6.4.4 BMPs for Infiltration and Bio-Infiltration Treatment, Page 6-27: General Comment: Clarify the difference between an infiltration pond (basin), trench and swale. It is not clear in the text or details how these three facilities differ.
 21. Requiring the designer to coordinate the selected BMP with Section 6.2 is redundant. Section 6.2 also refers to 6.4. If the designer goes through the selection process (provided that the language in the Steps is revised), he should have a list of what his requirements are and what BMPs can achieve the requirements. When the reader gets to 6.4.4, he should not need to go back to 6.2. If this reference must remain, revise introductory paragraph to say, “Selection of a specific BMP will depend upon having followed the Treatment Facility Selection Process in Section 6.2.”
 22. BMP T6.10: Revise to read, “Infiltration Ponds,” not ‘Basins.’ See Comment No. 14 above. Call out specific Section in Chapter 5, not just “Chapter 5.” (BMP T6.20 also)
 23. BMP T6.30: Replace “Preferred Method” with “Method No. 1,” typical.
 24. Preferred Method 1: Table 6.4.2, 6.4.3 and 6.7.1 all show a trend that indicates an increasing volume requirement per 1000 sq ft of impervious area as the 2 year – 24 hr precipitation range increases. For P=1.56 inches and greater, how do you know that the utilizing the Hydrograph Method will result in a volumetric requirement that follows the given trend?
 25. Alternative Design Method 1: This method as currently worded is not the method that Spokane County uses. As commented on previous draft reviews of this Chapter, revise the text to read: “This method matches Spokane County’s method and uses the first one-half inch of runoff from pollution-generating impervious surfaces (that are hydraulically connected to the treatment facility) to size the bio-infiltration swale. This method does not require treatment of any permeable surfaces such as lawn or landscaped areas.”
 26. Additional Design Criteria for Bio-infiltration Swales: Revise fourth bullet to read: “The maximum flood depth of swale should be 6 inches, prior to overflow to a drywell or other infiltrative facility.” Delete seventh bullet, as it is a duplication of the fifth bullet: organic content is covered there.
 27. Section 6.5.3 BMPs for Biofiltration Treatment, Page 6-31: The “General Criteria” overlaps with the actual “Steps” given to design a biofiltration swale. Take out the bullets that have repeated information encountered when designing the BMP and keep only the remaining bullets.
 28. Page 6-31 First bullet says that the swale should have a length of 200 ft and a maximum bottom width of 10 ft. It should be noted here that if 200 ft is not available, it does not rule out the possibility of using a biofiltration swale: if the length must be less than 200 ft, then the bottom width must be increased so that the total area of the biofilter is maintained.
 29. Page 6-31 Second bullet has a maximum slope that does not match King County’s biofiltration design procedure and also does not match the slope given on Page 6-15 of this Manual. Verify the correct maximum design slope and that the slope criteria is consistent in all of the places mentioned. Also, site the source.
 30. Page 6-31 Seventh bullet suggests placing a biofiltration swale within a pond where sufficient land does not exist for both. Where is this type of design discussed in the Manual?
 31. Design Procedure: Step 2 discusses a maximum slope that does not match King County’s biofiltration design procedure and also does not match the slope given on Page 6-15 of this Manual. Verify the correct maximum design slope and that the slope criteria are consistent in all

of the places mentioned. Also, site the source. Step 2 also mentions that when slopes are less than 2%, the need for under-drainage must be evaluated. Explain the criteria to determine when under-drainage is needed. Clarify why a under-drainage is needed for shallow slopes, it seems that the intent of a biofilter is to slow down the rate of flow over a gently sloping filter strip to provide the maximum amount of treatment.

32. Design Procedure: Step 9, revise second to the last sentence to state: “Check the shear stress or velocity to determine if erosive forces are present in the channel.” Provide criteria describing how to determine if erosion due to shear stress can be expected to occur. There should be a table of allowable velocities and shear stresses based upon the soils present. Step 9 states that typically “ $n = 0.04$ for the 25 year storm.” The friction value is not related to the recurrence interval, but to the ground cover that is being utilized.
33. Section 6.5.3, BMPs for Biofiltration Treatment, BMP T6.50 Vegetated Filter Strip, Page 6-34: Seventh bullet under “General Criteria” states that, “Vegetated filter strips should not be used on roadways with longitudinal slopes greater than 5 percent...” and Step 2 below in “Design Procedure” states that, “The maximum longitudinal slope allowed is 20%.” This is a 15% difference in slope recommendations. Correct the slope so that it is consistent in both places.
34. Page 6-34: Step 1 under “Design Procedure” says that the flow path is typically the “width of the paved area.” Unless the road is super-elevated, wouldn’t the flow path typically be the half-width of the paved area? This method could be used for a parking lot as well as a road, and in that case it would be the “width of the paved area,” but all of the examples given and even the details shown refer to ‘road’ and ‘roadway.’ This should be clarified.
35. Page 6-36, Figure 6.5.1, Filter Strip Design Graph, should be entitled, “Vegetated Filter Strip Design Graph” in the heading, and ‘Filter Strip Slope’ should be entitled, “Vegetated Filter Strip Slope,” in order to be consistent with the name of the BMP.
36. Page 6-37, Figure 6.5.2, Typical Filter Strip Details, should be entitled “Typical Vegetated Filter Strip Details,” in order to be consistent with the name of the BMP.
37. Section 6.6.4 Siting Criteria and Treatment Requirements, Page 6-38: Who is the local approval authority? Ecology or the local jurisdiction?
38. Tables 6.6.1 – 6.6.4: These tables contain a matrix for determining groundwater susceptibility and drywell suitability under different geologic conditions. Data collected on the Spokane aquifer indicates that susceptibility is much higher than would be indicated by applying these tables. See the attached detailed memo from Stan Miller for a complete discussion of this issue.
39. Table 6.6.4: According to the text on Page 6-42 (see first bullet), a site with moderate pollutant loading over an aquifer with very low susceptibility can discharge directly to subsurface if “source control eliminates or significantly reduces target pollutants.” The box reflecting these two site conditions needs to be changed to read ‘Direct Discharge following Source Control or Discharge following treatment.’
40. For Heavy Pollutant Loadings, How can the answer under High Susceptibility be “No Discharge,” and “Discharge following treatment and source control,” at the same time? The box should be reworded to state “Typically, no discharge allowed. Discharge following treatment and source control only allowed when ____.” Provide the criteria for when it is acceptable.
41. It is not obvious that the Footnotes and Notes for table are on the following page. Since the next set of information (“The following text can be used in conjunction with Table 6.6.4”) is also tied to the table, this information should be placed under a sub-heading called, “Information to be used in conjunction with Table 6.6.4.”

42. Page 6-41: Sub-heading: “Direct discharge to subsurface infiltration systems without treatment:” Delete this sentence from the first paragraph: “This includes discharges from non-pollutant generating surfaces such as landscaping and vegetated areas that have not been treated with pesticides or fertilizers, non-contaminant generating roofs, bicycle paths, etc.” To leave this in implies that a fertilized lawn is an area that must be considered for treatment. The first sentence above the first set of bullets seems to be a bulleted item that was mistakenly typed as a sentence; this matches what is shown in the table. Revise as a bullet.
43. Page 6-42, Sub-heading: “Discharge to subsurface infiltration systems following the use of treatment BMPs:”
- a) The entire Section 6.6 should italicize the loadings in order to help the reader follow along.
 - b) The Manual discusses wetpools in Section 6.7, but does not list it as a choice in any of the Chapter 6 tables. In addition, the Manual offers design information on wetponds and wet vaults, but not Water Quality Vaults (as listed here). Revise to either remove the BMPs that are not discussed or add design criteria information on these BMPs.
 - c) Are wetpools and wetponds the same drainage facility/feature?
 - d) Under “Treatment BMPs include:” This paragraph indicates some BMPs, such as water quality vaults, wetpools and oil water separators “may be limited to certain land uses or to areas where the susceptibility to contamination is moderate.” This section, or the section on each BMP, should be expanded to answer the following questions:
 - o What land uses are these BMPs limited to?
 - o What areas are these BMPs limited to?
 - o Are they limited to areas of very low, low, or moderate susceptibility?
44. Page 6-43, The section that begins, “The following uses of subsurface infiltration systems may not be allowed due to potential contamination...”
- a) The “Introduction” indicates that this manual has no independent authority and is only technical guidance. Therefore, this manual alone cannot prohibit uses. This prohibition would need to be contained in the new UIC rule and would likely only give Ecology the authority to prohibit specific land uses.
 - b) Local governments do not have the authority to prohibit uses. Local governments also do not have the authority to require or review management plans for storage and spill prevention.
 - c) This section should be revised to discuss what law prohibits the uses of concern and what agency will regulate this prohibition.
 - d) The “activities” that have a “high risk of runoff becoming contaminated,” and have the potential to be prohibited, need to be listed.
 - e) Table 6.6.4 does not indicate that sites with Moderate Susceptibility and accept runoff from Commercial or Industrial sites or High ADT Roads “may not” be allowed to utilize subsurface infiltrative systems. Revise text to match table.
45. Section 6.7 Wetpool Facilities, Page 6-43:
- a) It would appear that the only difference between a Basic Wetpond and a Large Wetpond is given by a sentence in Step 1 under 6.7.3 Design Criteria (Page 6-45), wherein a Large Wetpond is the size of a Basic Wetpond increased by 50%
 - b) When is a wetpool required or best utilized?
 - c) The detail shown in Figure 6.7.1 on Page 6-45, indicates an “access road to an outlet structure.” How can this BMP have an outlet when the text on Page 6-43 says that, “..the only discharge is by evaporation and slow infiltration. The following text indicates that indeed the wetpond is designed like a detention pond, thus the text on Page 6-43 needs to be revised to account for this form of discharge from this BMP.
 - d) Under 6.7.3, Design Criteria: the first bullet should be a sub-heading or sentence, not a bullet.

46. Section 6.8.4 Site Suitability, Page 6-61: A criterion listed for siting a sand filtration system says, "Average winter conditions at the project site do not create snow or ice conditions that prevent the filter from operating as designed." Snow or ice conditions are very common in Eastern Washington during the winter, and perhaps this BMP should not be included. Ecology indicated that there were things that could be done with sand filters to make them acceptable BMPs for winter conditions and that these design modifications would be included in a future draft. To-date, only Cold Weather Considerations have been mentioned; no recommendations, modifications or suggestions have been included.
47. Section 6.8.5 Design Criteria, Item No. 5 under 'Additional Design Information' on Page 6-66: second to the last paragraph: the word "basin" should be revised to "pond."
48. Section 6.8.7 Maintenance Criteria, Page 6-67: The bulleted items in this section seem to ignore the 3 inches of topsoil shown in Figure 6.8.1 on page 6-69. The sand is shown as being underneath 3 inches of topsoil. Therefore, the topsoil would have to be removed before the filter surface could be aerated. Removing the topsoil to aerate the filter surface would accomplish scraping the top layer of fine-grain sediment. Therefore, the bulleted items should include removing and replacing the topsoil in the list of maintenance items. A specification for the topsoil should be added to the design criteria so that the storm water can percolate to the sand filter.
49. After 6.8.7 Maintenance Criteria, BMP T6.90 Sand Filter Vault, Page 6-70 & 6-71:
 - a) This looks like it is part of "Maintenance Criteria" because it is the last thing in the section. Consider a new sub-heading: 6.8.8 Sand Filtration BMPs.
 - b) Third bullet: Where is the 8-inch distance between the top of the spreader indicated on the detail?
 - c) Third bullet: Detail shows flow going under a baffle. Bullet says over the top of a wall. Where is this indicated on the detail?
 - d) Third bullet: How do you size the "permanent pool volume in the first cell?"
 - e) Fourth bullet: Where is the inlet and pipe manifold on the detail?
 - f) Fourth bullet: If multiple inlets or multiple holes in spreader manifold are recommended, then this should be noted on the detail.
 - g) Fifth bullet: Where is the erosion protection located on the detail?
 - h) Fifth bullet: Where is the geotextile fabric located on the detail? Does the "gravel debris screen" shown on the detail satisfy either the requirement for erosion control or geotextile fabric?
 - i) Sixth bullet: Where is the geotextile fabric shown on the detail?
 - j) The "Design Criteria" should dovetail with the detail; most, if not all, of the items discussed should be shown on the detail, or footnoted, at a minimum.
50. After 6.8.7 Maintenance Criteria, BMP T6.91, Linear Sand Filter, Page 6-72: Provide a detail for this BMP. How do you size the cells? Minimum dimensions are given, but directions for volume sizing are not included.
51. Section 6.11.1 Phosphorus Treatment, Page 6-82:
 - a) Table 6.11.1, Page 6-84: Several of the treatment facility options (any of the sand filter, wetpool, or wetpond options) for metals (and phosphorus) treatment are not recommended (Section 6.8.4 Site Suitability, second bullet, Page 6-62) for regions with climates such as that found in Eastern Washington. Provide specific recommendations as to how to "make" these options function properly in Eastern Washington or take them out of the Manual.
 - b) Under "Infiltration preceded by Basic Treatment" and "Infiltration preceded by Phosphorus Treatment." No infiltration options should be available for soils that do not meet the site suitability criteria for infiltration treatment. If the soils do not meet the SSC for infiltrative treatment, then infiltration should not be an option. These paragraphs need to be revised to be consistent with the section on site suitability.

- c) Amended Sand Filter: It says see Section 6.8. Amended Sand Filters are discussed in Section 6.12 on Page 91.
- 52. Section 6.11.2 Metals Treatment, Page 6-84 and 6-85:
 - a) Under “Infiltration preceded by Basic Treatment” and “Infiltration preceded by Metals Treatment.” No infiltration options should be available for soils that do not meet the site suitability criteria for infiltration treatment. If the soils do not meet the SSC for infiltrative treatment, then infiltration should not be an option. These paragraphs need to be revised to be consistent with the section on site suitability.
 - b) If Metals Treatment is applied only when discharging to fish bearing lakes or streams, then why does the text on Page 6-85 imply that an infiltration structure is to be used first prior to discharge? If you are infiltrating, they you aren’t discharging to a stream (or water source). This needs to be better explained in the body of the text if it is correct and is to remain in the Manual.
- 53. Section 6.12.5 Assessing Levels of Development of Emerging Technologies, Page 6-88: Second Bullet: the sentence that begins: “To obtain general statewide acceptance...” should be changed to “To obtain acceptance in Eastern Washington...”
- 54. Section 6.12.6 Examples of Emerging Technologies for Stormwater Treatment and Control, Page 6-89: Figure 6.12.1, Vertical Media Filter: It was agreed at a Manual Subcommittee meeting that brand names of proprietary software, structures, etc. would not be published in this Manual. Thus, the “Courtesy of Stormwater Management Inc.” should be removed as a footnote below the figure.
- 55. Appendix 6A Recommended Maintenance Criteria, Page 6-97:
 - a) What about maintenance criteria for drywells and bio-infiltration facilities (ponds, swales, trenches and grassed-percolation areas)?
 - b) Every BMP in Chapter 6 that has its own “Maintenance and Operations” section should refer to the Appendix for more detailed information.

34 USPS:

1. Have pollutant levels been identified that confirm attainment of the Non-endangerment performance standard? If so where can they be found?
2. The USPS seeks definitions for the terms handle, potential and hazardous substances as used on page 2-18: handle hazardous substances and the potential to reach the subsurface. We encourage the authors to consider including some additional *de minimus* levels for these activities and a “No Exposure Certification” option.
3. For existing dry wells, where a “project” exceeding thresholds is initiated, will siting criteria and treatment requirements need to be evaluated and determined (Section 6.6.4)?
4. We suggest additional investigation into determining actual pollutant loading associated with parking lots. Investigation should strive to deliver some objective standards where possible. Using ADT for roads seems reasonable but the USPS struggles to see how Traffic Estimations reflect exposures from parking lots. Average Daily Vehicle trips, and pollutant loading (light or heavy) all affect which Manual elements will be mandatory.
5. We believe there is a conflict in the language within Table 6.6.4 and the supporting text on page 6-41. Clarify the list of non-pollutant generating surfaces that are allowed direct discharge without treatment. The Manual should also define non-contaminant generating roofs.

36 ACEC Spokane:

1. Chapter is hard to follow. It was very time consuming to try to figure out. Titles on one section should be consistent with titles or labels in tables, charts, etc. Keep items in same order when listing choices in two different places (i.e. in the text and then in a table or figure).

2. Section 6.2.1

- a) Page 6-4, Step 1, first paragraph: The title just above the first paragraph says “Determine if Treatment is Required and Apply Infiltration BMP”. The first sentence of the first paragraph directs the reader to Section 6.4. Section 6.4 does not tell if treatment is required.
- b) Page 6-4, Step 1, second paragraph: First sentence talks about pretreatment facilities however it does not tell when pretreatment is required.
- c) Page 6-4, Step 1, second paragraph: Seems to be in conflict with Figure 6.2.1 which indicates that if the site doesn’t discharge to subsurface infiltration, then you apply pretreatment. Which is it?
- d) Page 6-5, Step 2, second paragraph: Experience with local government has shown that they will only tell you what is required within their jurisdiction and they believe that this is the limit of their responsibility. Since local government will not tell about state or federal requirements, suggest indicating that the developer/owner/engineer needs to check all other agencies for requirements.
- e) Page 6-6, Step 3, Application on the Project Site: The discussion seems a bit too detailed. Is this necessary or why not treat everything?
- f) Page 6-7, first paragraph: First sentence refers to Section 4...should reference Section 6.4.
- g) Page 6-7, Step 4: Suggest rewording title to match Figure 6.2.1.
- h) Page 6-7, Step 4: If local government doesn’t control phosphorous, are you exempt?
- i) Page 6-8, Step 6: Determining if metal treatment is required is not up to local jurisdiction?
- j) Page 6-8, Step 6: Lists 4 bulleted types of projects...what about other types of projects (i.e. residential, educational, institutional, etc.)?
- k) Page 6-8, Step 6, last sentence: Another analysis is required to determine the 50% exception? Do we need this?
- l) Page 6-10, Figure 6.2.1: This figure could use work. It needs to be coordinated with titles in the chapter that are worded differently on the figure, keep lists in the chapter in the same order on the chart (makes it easier to follow), and names on the figure that are slightly different than in the text of the chapter. Right now this figure is more work to figure out than to use.
- m) Page 6-11, Figure 6.2.2: Coordinate title with text in Section 6.4 (per Step 1).

3. Section 6.2.2

- a) Page 6-12, Cold Weather Considerations: Interesting and OK to keep, but what is the point of this section in the guidelines?
- b) Page 6-14, Cold Weather Areas in Eastern Washington: Why do we care what the rest of the United States is doing?

4. Section 6.2.3

- a) Page 6-15, Figure 6.2.3: This map should only show Washington State and should be of better quality so that it is easier to read.
- b) Page 6-15, Section 6.2.3: Would rather see this information and the impacts listed with each BMP. Having this information here causes too much chance of missing it.
- c) Page 6-16, Table 6.2.1:
 - 1. Roofs: Need a footnote for item “*Vents & Emissions (2)*”

2. Streets and Highways: Do these really need to be separate categories? Why not just one category for streets?
3. Streets and Highways: Definition for “High Use Site Intersections”?
4. Other Sources: Recommend eliminating pest/herbicides from the residential development section. This is not a big deal.
- d) Page 6-17, Table 6.2.2, Footnote 2: What about other soils? We use many other soils.
- e) p. 6-17, Table 6.2.3 Insert column between soil type and infiltration columns showing unified soil classification designations which correspond to SCS soil type
- f) Page 6-18, Table 6.2.4: Bullet items are too detailed in this table. If they are kept, suggest putting this table by the BMP’s that are discussed.
5. Section 6.3 Page 6-19, Section 6.3: Title is “General Requirements for Stormwater Facilities”. Are these really requirements?
6. Section 6.3.1 Page 6-19, Summary of Areas Needing Treatment, third bullet: Why? Metal roofs are generally not treated now.
7. Section 6.3.3 Page 6-21, Side Slopes and Embankments, last bullet: Does this apply to berms in swales? Is there a height limitation that causes compliance with the listed WAC?
8. Section 6.3.4 Page 6-21, Section 6.3.4: Why is some of the information on maintenance in Appendix 6A? Can’t it all be together?
9. Section 6.4 Page 6-21, Section 6.4.1, last sentence of first paragraph: How far will this be taken? This is typically not considered in current design standards.
10. Section 6.4.3
 - a) Page 6-24, SSC-3: Is it necessary to provide infiltration testing? What is the acceptable method to prove this?
 - b) Page 6-25, SSC-7: This is not always required (construction monitoring) and the recommended monitoring “quarterly over a 2-year period” will never happen.
 - c) Page 6-25 and 6-26, Sizing Criteria: Conflicts with SSC-3 statement that the infiltration basin must empty “maximum ponded depth (water quality volume)” within 24-hours.
 - d) Page 6-26, Verification of Performance: This will never happen unless it is required.
11. Section 6.4.4
 - a) Page 6-27, BMP T6.10 and T6.20: The design is listed as “identical to the procedure given in Chapter 5, except”...are these exceptions listed in Chapter 5? Why not list the design procedures here with the “exception” included?
 - b) Page 6-27, BMP T6.21: Should spell out what SSC-5 is in case someone did not read this manual from front to back.
 - c) Page 6-27, Preferred Method 1: Why is this the “preferred method”? If the designer or the local jurisdiction can choose the methods, these should be labeled something else (i.e. method 1, 2, 3 and 4).
 - d) Page 6-28, Equation for required volume: The “R” value is described as the runoff volume shown in column 4 of Table 6.4.3... column 4 of Table 6.4.3 is “Examples of Applicable Sites”.
 - e) Page 6-28 and 6-29, Tables 6.4.2 and 6.4.3: Either more information is needed or these tables can be eliminated because they are not very useful in the current situation. Why not list Spokane as one of the example sites?

- f) Page 6-29, last bullet item: Spokane County allows higher flooded depths based on certain circumstances...do not limit it to 6-inches.
12. Section 6.5.3
- a) Page 6-31, General Criteria, first bullet: Why does this use the 6-month storm? Shouldn't it match the design storm?
 - b) Page 6-34, General Criteria, first bullet: Only 1-foot (minimum) is listed for this same dimension on Figure 6.5.2...which is it? One foot or 3-feet?
 - c) Page 6-34, General Criteria, fifth bullet: This is not OK for road widths with center crowned sections that have a half width greater than 30-feet? Figure 6.5.2 indicates that flow paths in excess of 50-feet can contribute...which is it?
 - d) Page 6-37, Figure 6.5.2: Coordinate with comments 37, 38 and 39.
 - e) Page 6-37, Figure 6.5.2, Section A-A: Filter strip lists a range of (1%-15% long. slope) however Step 2 on page 6-35 lists a range of 2%-20% slope. Which is it?
13. Section 6.8.4 Page 6-62, second bullet: Most areas of Eastern Washington experience snow or ice...is this an appropriate BMP to suggest for this area?
14. Appendix 6A
- a) Page 6-100, Maintenance Component, General: Why is there a duplication of "General" items for wet ponds? See page 6-97 and page 6-100.
 - b) Page 6-101: It would be much better if all the boxes that say "See Wet Ponds" were actually filled in with the text from the Wet Pond section. This document has enough flipping back and forth and the benefit is greater than the extra paper and ink.
 - c) Page 6-101, Emergency Overflow Spillway: The sections "Rock Missing" and "Erosion" are referred to the Wet Pond section. The Wet Pond section under subsection Emergency Overflow/Spillway does not have either of these defects listed.
 - d) Page 6-105, No. 6 – Debris Barriers, Damaged/Missing Bars: Shouldn't the tolerances of "needing maintenance" and the "fix" match? 3" vs. ¾"?
 - e) Page 6-105, No. 6 – Debris Barriers, Inlet/Outlet Pipe: Already mentioned the "missing barrier" condition above...eliminate here?
15. If a drywell needs an oil/water separator will a turned down PVC pipe suffice or does an actual oil/water separator need to be installed and maintained? An oil/water separator must be used if one is required. A turned-down PVC elbow is not an oil/water separator, but this design idea will probably do a good job of protecting a drywell in the event of a spill.
16. Drywells and Percolation Trenches: will monitoring be required? If so, how often? It is unlikely that monitoring will be required. There may be exceptions, for example in the few cases where individual state waste discharge permits are required. Monitoring may also be part of the adaptive management feedback loop to justify the "presumptive" approach to protecting water quality. O&M requirements may include inspections of catch basins or other pretreatment devices associated with the drywells.

37 Ecology:

- 1. (Feedback Requested 6-1) It would be helpful to have notes on BMPs which should be preferred, adapted, or eliminated from consideration for use under specific conditions. The Manual covers a large and varied area, and such qualifiers may be appropriate and helpful to project proponents. [Perhaps some kind of indicator for recommendations or notes specific to cold weather uses (such as a snowflake), discharges to ground (such as "UIC"), or areas of the lowest rainfall (such as a cactus) might be used to indicate to

readers that a BMP may or may not be especially suitable or applicable when these conditions apply.] Ecology staff submitted the following specific recommendations for addressing cold-weather BMPs in Chapters 5, 6, and 7; we hope that the Subcommittee and consultant identify more guidance for both arid and cold-weather conditions than is included here. See also our comments for Chapter 8 concerning the use of salt for de-icing.

- a. Median strip trench (p. 5-44): Dumping or pushing parking lot snow over strip trenches will increase their likelihood of their plugging.
 - b. Dispersion berms (p. 5-53) may cause problems with plowing or traction in snowy areas. Consider the use of depressions for dispersion in these areas.
 - c. Ice formation may be reduced by having stormwater structures on the south side of buildings (p. 6-13). This concept should also be included in Core Element #1.
 - d. Evergreen trees should not be used on the south or west side of wet ponds in cold areas because they impend natural ice melting (p. 6-52).
 - e. BMP C106 Wheel Wash (p. 7-37): Use of wheel washes during freezing weather is not recommended because of ice formation on surrounding streets.
2. Chapter 6.6, particularly Tables 6.6.1 through 6.6.4: Ecology is in the process of revising the Underground Injection and Control (UIC) rule provisions related to stormwater discharges. The UIC advisory committee is reviewing this section and these tables, and plans to propose revisions at its next meeting on January 23rd, 2003. We request that the Manual Subcommittee (several members of which are participating in the UIC advisory committee meetings) also consider those recommendations in revising the Manual.
 3. Page 6-43: The Manual should clarify that infiltration of stormwater is not recommended on or up-gradient of contaminated sites where infiltration of even clean water can cause contaminants to mobilize; infiltration is not practical in areas with shallow groundwater; and infiltration above steep slopes can cause soil instability problems and is not recommended.

38 Ten Cities:

1. Soil/subsurface moisture content is an important component to any calculation of infiltration capacity/quantity in arid and semi-arid environments. In fact, highly porous or permeable materials may not easily transmit water under unsaturated conditions. This concept generally does not seem to be evident in much of these chapters.
2. At a minimum, soil/subsurface moisture conditions need to be factored into susceptibility assessments and runoff loading calculations/estimates. This could be done in some sort of rainfall/infiltration component in aquifer susceptibility ratings.
3. Should runoff quality be addressed before runoff quantity (Ch 5)? Whether or not runoff is polluted needs to be considered before structures are designed for retention, disposal, infiltration, etc. This conceptual approach would seem to be more in line with how a manual user would design a system. We suggest that Chapters 5 and 6 be reordered.
4. p. 6-1 Feedback requested on arid and cold-weather BMPs: Kennedy/Jenks is analyzing this information for the City of Pasco and will provide this information to Ecology at a later date.
5. p. 6-22 Feedback requested on infiltration rates: Kennedy/Jenks is analyzing this information for the City of Pasco and will provide this information to Ecology at a later date.

6. p. 6-39 Table 6.6.1 to 6.6.4. These need to be consistent with UIC rule changes and should include precipitation in some way. UIC advisory group is currently looking at redoing these tables. This revisions, once done, need to be incorporated into manual.
7. Table 6.6.1 isn't clear in the use of the geologic matrix. Does one pick the shallowest geologic materials or those with the lowest unsaturated hydraulic conductivity? The Manual should clarify this, possibly incorporating vadose zone concepts with respect to unsaturated moisture movement.
8. Table 6.6.4: Are the surfaces used in the table comprehensive enough? When an aquifer has a very low susceptibility to contamination from runoff, the need to treat runoff should be tied to other issues, not the aquifer. The range of surfaces needs to be matched to their significance in arid and semi-arid climates and other human activities. Also, in those circumstances where a very low susceptibility aquifer is present runoff treatment (if any) should be evaluated against other conditions, not impacts to the aquifer.
9. p. 6-87 New and Emerging Technologies: This website is well organized and provides very useful information on developing technologies for stormwater management. It would be helpful if Ecology also provided a list of recommended BMPs and technologies that are included in the Manual for each of the treatment processes listed on the emerging technologies website. For example, categories could include sedimentation, flow control, nutrient removal, oil/grease removal, etc.

39 City of Spokane:

1. This chapter might be better titled: "Runoff Treatment - Water Quality Facility Design."
2. This chapter is especially bulky and shows the effect of importing much of the material from the Western Washington document. This might be the one chapter that should be condensed substantially.
3. An effort could be made to tie together chapter 2 with these later chapters containing the BMPs.
4. Where do we address treatment for bacteria? This can be a major concern over aquifers.
5. The City of Spokane uses catch basins extensively ahead of drywells and conveyance systems. We believe that they provide some benefit for both TSS and oil containment. This is supported by the type and amount of sediment removed from these structures on a yearly or better basis. We should address their benefit within this document.
6. 6.2.2 Annual Rainfall - Is the use of arid and semi-arid consistent with the rainfall levels that we are talking about? Arid being up to 16 inches and semi-arid to 35 inches. If not, either change or discuss the definition in the glossary regarding the use of these terms in this manual.
7. 6.3.1 Summary of Areas Needing Treatment - 3rd bullet, add "zinc-coated" in front of roofs. Are there other metals we should be concerned about which may leach?
8. 6.3.3 Setbacks, Slopes, and Embankments - This is covered in other areas. Can we find a central location for this and refer to that location?
9. 6.4.4 BMP T6.10 Infiltration Basins - This is a great attempt to condense. Make an attempt to do more of this.
10. 6.6.4 Siting Criteria and Treatment Requirements - 3rd bullet, high ADT, we could include the definition in the glossary.
11. 6.6.4 Direct discharge to subsurface infiltration systems without Treatment - "Susceptibility to contamination is very low or low" should be its own bullet.
12. 6.7.3 Design Criteria - remove first bullet ahead of statement.

13. Table 6.2.2 - Doesn't bioinfiltration largely remove phosphorus?
14. Table 6.2.4 - Why is irrigated grass not a possibility for Arid Watersheds?
15. Table 6.6.4 - below table, make sure that the italicized Notes for Table 6.6.4:" is moved to the top of the next page.

40 WSDOT:

16. Page 6-1: Feedback requested 6-1. Filter strips can be enhanced with compost to decrease runoff and maybe even allow for steep application like on 4:1. WSDOT has developed and is currently revising and updating its Highway Runoff Manual (HRM). There may be new technologies or BMPs that are in or will be in the HRM update. As part of the HRM update, there are identified differences and concerns with the Western and Eastern WA stormwater manual that need to be addressed. The WSDOT is developing policy papers that they will be coordinating with and taking to Ecology for resolution. Some of those issues are in this chapter.
17. Page 6-2: Performance Goals, Phosphorous Treatment: WSDOT realizes that these are performance goals, but normally roadway and street runoff do not contain large amounts of phosphorous. If it does get in roadway runoff, it would from an off-site location like agriculture or resident sources. Having to treat for pollutants contributed by off site-sources would put a burden on the agency rather the source. Step 5 on page 6-7 should not be required for roadway projects.
18. Page 6-3: Performance Goals, Metals Treatment: Ecology and this manual admits that it has limited data, science or information to support that metals are at concentrations or a concern in roadway runoff. Therefore, until there is more science or data to justify metals treatment, this issue or goal should be removed as a requirement for the treatment of roadway runoff. Step 6 on page 6-8 should not be required for roadway projects.
19. Page 6-6: Recommend adding an oil boom in detention ponds as another option for oil control treatment. See WSDOT draft Policy Proposal on Oil Control (Available for download from E WA Stormwater Project ftp site).
20. Page 6.7: Step 5. See WSDOT Policy Proposal on Phosphorous Treatment.
21. Page 6-8: Step 6. Sand filtration treatment facilities are not feasible in eastern Washington because of freezing conditions. Other options need to be available if enhance treatment is to apply in eastern Washington. Need a definition of arterials and highways. WSDOT would like to see an average daily travel (ADT) or other threshold for roadways to determine when metals treatment should apply. There is no definition of threshold discharge nor is it mentioned in the Core Elements. See WSDOT Policy Proposal on Enhance Treatment.
22. Page. 6-15: Section 6.2.3, Slope. Add statement that slopes steeper than 15% need to be analyzed by an engineer for stability. Slopes greater than 15% should not have a hard prohibition.
23. Page. 6-21. Are infiltration trenches "surface" infiltration in eastern Washington?
24. Page 6-22: Feedback requested 6-2. The highly permeable soils can handle even most high intensity thunderstorms with minimal runoff and most long duration storms. It is the rain on snow or frozen ground that causes the major problems because the soils ability to infiltrate is blocked. Then the problem becomes a flooding concern. See response to Feedback requested 5-2 under comment #50.
25. Page 6-24: SSC-3. Infiltration rate of 0 to 2.4 inches/hour is too restrictive in that it is impractical to define an infiltration rate to this small of range. Media-based criteria, such

as used by Spokane County or described in SSC-5, such as of 6 inches of topsoil should be sufficient. Drawdown time does not concur with previous criteria of the 72-hour period instead of the 24-hour.

26. Page 6-27: Section 6.6.4. Why state an infiltration rate for quality treatment? What happens if the infiltration rate is too high? For example, it does not make sense to have to line ditches for treatment. Recommend also allowing the use of a given media that meets the treatment objectives.
27. For constructed basins, trenches, swales, etc., soils amendments to reduce infiltration rates to 2.4 inches/hour is probably all right. However, this philosophy should not be transposed over to constructed roadside ditches that infiltrate stormwater. Existing native soils should be utilized without soil amendments under most circumstances. Natural dispersion and infiltration into native soils in roadside slopes and ditches are the best and most reliable stormwater treatment methods in eastern Washington.
28. Page 6-27: BMP T6.30 Bio-infiltration Swale. If all methods are valid, the designing engineer should be able to pick the method that fits the site best. Local jurisdiction should not be able to limit types of method used. Infiltration rates should not be specified.
29. Page 6-28: Table 6.4.2. Not sure if or how this table or other method takes into consideration of runoff in an open system like a roadside ditch that is infiltrated before it gets to a constructed facility like a swale, infiltration pond, etc. Constructed ditches with intermittent spaced rock or soil dams should be acceptable infiltration systems for long linear projects like roadways in place of ponds, vaults, etc.
30. Page 6-30. Fourth Bullet. Infiltration rate discussion is confusing.
31. Page 6-31: BPM T6.40 Biofiltration Swale. Add velocity less than one foot/second in the General Criteria bullet one.
32. Pages 6-32 & 33: Design Procedure, Steps 4 & 7. Recommend looking at the Manning n value again for east side grasses and conditions. The equation in Step 4 should be adjusted to allow for selection of an appropriate Manning's n based on type of grass used. In Step 7, minimum length is 100 feet.
33. Page 6-35: BMP T6.50 Vegetated Filter Strip, Step 2. Why is the maximum slope set at 20%? Recommend setting it at 25% for a 4:1 if slope is amended with compost to reduce runoff.
34. Pages 6-34 to 36: BMP T6.50 Vegetated Filter Strip. Extend flow path to a maximum width to 40 feet and add additional width line to Figure 6.5.1. This allows use on typical 2-lane shed roadway section. Could be justified by lower hydraulic loading in eastern Washington and increased filter strip width up to 20 feet.
35. Page 6-37: Figure 6.5.2 indicated longitudinal slope of 1-15% and the compost is already included in the detail. Should explain the benefits of compost and be given credit when used. Roadway subgrade material should be adequate and function as the flow spreader or gravel filled trench adjacent to the pavement.
36. Page 6-38. Section 6.6, Subsurface Infiltration. Should add trenches to this section. Define pollution loading from streets and highway by ADT instead of Rural Highway, Arterials, and urban Highways in such a way that High ADT intersections are defined.
37. Pages 6-40 & 41. Should consider defining pollution loading from streets and highways by ADT instead of Rural Highway, Arterials, and Urban Highways in a way such that High ADT intersections are defined.

38. Page 6-60: Sand filtration treatment facilities are not feasible in eastern Washington because of freezing conditions.
39. Page 6-62: The large sand filter incorporates King County design criteria of 95% of the annual runoff and not the proposed east side criteria.
40. Page 6-82: 6.11.1 Phosphorus Treatment. There is not science, data, information, etc. that phosphorus comes from roadways or vehicles. Any on the roadway would come from off site or from the air. Therefore, roadway should be exempt from phosphorus treatment. Also, it appears that infiltration is to be restricted within ¼-mile of a lake or receiving water. This seems to be excessive, even with ESA issue only a 300 ft. buffer or set back is necessary. WSDOT is developing a position paper on the issue as part of the Highway Runoff Manual rewrite that it will be coordinated with Ecology. See WSDOT Policy Proposal on Phosphorous Treatment (Available for download from E WA Stormwater Project ftp site).
41. Page 6-83: 3rd paragraph. A link to or list of phosphorus sensitive waters should be included.
42. Page 6-84: 6.11.2 Metals Treatment. The performance goals indicate that there is sparse science, data, information, etc. available that metals are a problem or that treatment facilities are effective in removing metals, yet it lists that metals treatment is required for arterials and highways. Therefore, until more science, data, etc. are available to quantify an impact or problem, the roadways should be exempt from metals treatment. WSDOT is developing a position paper on the issue as part of the Highway Runoff Manual rewrite that it will be coordinated with Ecology. See WSDOT Policy Proposal on Enhanced Treatment (Available for download from E WA Stormwater Project ftp site).
43. Page 6-87: Feedback requested 6-3. WSDOT has extensive history, research, process, etc. that they have used to develop and test stormwater BMPs and technologies. A lot of them are included in this and other manuals. Ecology should make the process simple for submittals with backup and support documentation to the proposed Technical Review Committee. Due to WSDOT expertise, WSDOT may want to be a member of this committee, not just local governments.

Chapter 7 Construction Stormwater Pollution Prevention

Public Workshops:

1. Include erosivity waiver in Manual

32 Wenatchee UA:

1. It would be useful to have a list/index of the Construction Stormwater BMPs included.

33 Spokane Co:

1. General Comment: The BMPs in this chapter are related to the Ecology approved Construction Stormwater General Permit which requires a Construction SWPPP. Local jurisdictions should not be required to review or approve a Construction SWPPP, it should be submitted to the local jurisdiction already reviewed and approved by DOE. The local jurisdictions should not be responsible for the SWPPP.
2. Section 7.1.1 Objective, Page 7-1: 3rd paragraph: An initial discussion with regard to the project would not include the contractor at this stage of the design. It would be a rare situation in which the contractor has been chosen prior to the development of the road and drainage plans. In a private or commercial development, the owner/developer typically hires a design engineer who meets with the local jurisdiction for guidance to develop a set of road and drainage plans. When the plans have been accepted by the local jurisdiction, the owner/developer takes his plans to several contractors for a bid estimate. For a public project, road and drainage plans are developed by the local jurisdiction and put out for public bid. The contractor is never a part of the design process in the public sector, and only very rarely in the private sector. All references to contractors and compliance inspectors should be deleted.
3. Section 7.1.3 How to Use This Chapter, Page 7-2: First paragraph, first sentence: This sentence should also refer the reader to Core Element No. 2, which is the requirement to develop a Construction SWPPP. The reference to “Section 2” and “Section 3” has been mentioned in previous Manual comments. What Chapter would these Sections be found in?
4. Section 7.2 Planning, Page 7-9 and 7-10: The last paragraph on Page 7-9 states that, “The Construction SWPPP may be a subset of the Stormwater Site Plan or construction plan set,” but under Section 7.2.1, second paragraph, it states that, “the Construction SWPPP should be a separate document that can stand alone.” If it is intended that the specific SWPPP sheets can stand alone, but should be included as a part of the entire set of plans, then this is what should be stated in both places.
5. Section 7.2.1 General SWPPP Guidelines, Page 7-10:
 - a. First paragraph and third paragraph: Who is the local permitting authority? Is it Ecology or the local jurisdiction?
 - b. First paragraph: If the definition of “local permitting authority” is the local jurisdiction, then the statement that “the local permitting authority must review the Construction SWPPP,” is incorrect. As of March 10, 2003 (Page 1-9), a Construction Stormwater General Permit will be required for site disturbance of one acre or greater. This permit is granted by the Department of Ecology. Since a Construction SWPPP is a required element of the Permit, the review and approval of any Construction SWPPP would occur at the time the Permit is granted. The Ecology approved SWPPP would be included in the construction plan set only for the purpose of implementation during construction; not for local review.

- c. First paragraph, last sentence: Very few, if any, “single-family home construction projects” will involve the disturbance of 1 acre or more.
- d. Third paragraph: The statement that, “As site work progresses, the plan must be modified to reflect changing site conditions...” is inappropriate. Unless Ecology plans to have the contractor (who has not played any role in the development of the SWPPP) contact Ecology for approval of any changes to the SWPPP, the local jurisdiction will not allow changes to the SWPPP. The SWPPP becomes a permanent part of the construction plan set and if it is altered in anyway, the design engineer must submit for a plan change. However, since Ecology has the approval authority for any Construction SWPPP, the local jurisdiction would not approve any changes that have not been reviewed and approved by Ecology.
- e. Page 7-10, What is an adequate SWPPP?
 - i. This entire section is a duplication of information found on Page 3-4.
 - ii. Wherever the information is found, it should be made clear to the reader that this an Ecology approved item and that it is a part of a Construction Stormwater General Permit which is reviewed and approved only by Ecology.
 - iii. The statement in this section requiring information about the construction schedule to be included in the Construction SWPPP narrative is unrealistic. At the time that plans are developed and prepared, the construction schedule is not known. It is not until the plans are completed and accepted by the local jurisdiction that a contractor’s bid is sought out.
 - iv. The 12 steps that are referred to need to be identified as being found in Section X.X in this or another chapter.
- f. Page 7-11, BMP Standards and Specifications: Are the references to Chapter 6 correct? It seems as if the references (3) should be to Chapter 7.
- g. Page 7-11, General Principles: Sixth bullet cannot be reasonably implemented.
- 6. Section 7.2.2 Step-By-Step Procedure, Page 7-12:
 - a. First paragraph, last sentence: “single-family home construction projects” do not typically involve the disturbance of 1 acre or more. Thus, the reference to single-family homes should be deleted.
 - b. Step 1 – Data Collection, Precipitation Records, Page 7-13: The last sentence should include the same wording for Precipitation Records in Step 2 – Data Analysis, Page 7-14.
 - c. Step 3 – Construction SWPPP Development and Implementation:
 - i. The project proponent does not develop the SWPPP, a licensed civil engineer prepares it along with the construction plans.
 - ii. Element #4: Who is the Local Permitting Authority? If the “Local Permitting Authority” is the local jurisdiction, and if the Construction SWPPP guidance remains in the Manual, the last sentence in bullet number two needs to be deleted; the local jurisdiction has no authority to review or approve a Construction SWPPP.
 - iii. Element #12: Fourth bullet, second paragraph: The “Qualified Professional in Erosion and Sediment Control” cannot be identified in the Construction SWPPP because the owner/developer will not know who that person is until the project has gone out for bid.

7. Section 7.3.1 Source Control BMPs: BMP C160 Contractor Erosion and Spill Control Lead, Page 7-69: The Construction SWPPP cannot include the name, telephone number, fax number and address of the designated CESCL because the owner/developer will not know who that person is until the project has gone out for bid.

36 ACEC Spokane:

1. Page 7-10. Section 7.2.1 General SWPPP Guidelines – subheading What is and Adequate SWPPP?, first paragraph: Can narrative be brief notes on plans?
2. Page 7-11. BMP Standards and Specifications – sixth bulleted item: Revise sentence to read as follows: “Before reseeding a disturbed soil area, amend soils when practical with compost wherever topsoil has been removed.”
3. Page 7-12. 4th bulleted item from the top of page: Revise sentence to read as follows: “Minimize the tracking of sediment off-site.”
4. Page 7-12. Last paragraph first sentence: Revise sentence to read as follows: “Soils should if possible, be characterized for permeability, percent organic matter, and effective depth by a qualified soil professional or engineer.”
5. Page 7-14. Second paragraph, Soils: first sentence: Add the words “As practical” at the beginning of sentence.
6. Page 7-15. Element #2: Establish Construction Access, fourth bulleted item: Revise sentence to read as follows: “Roads shall be cleaned thoroughly at the end of each day or as agreed upon with the regulatory authority.”
7. Page 7-17. delete entire First bulleted item at top of page.

39 City of Spokane:

1. It is not clear in either Chapter 7 or Chapter 2 when implementation of the Construction Stormwater Pollution Prevention Plan would be required. If the intention is to be clear about when these measures need to be in place, then add additional language. We would prefer that this be left up to local control and have no problem with not addressing this issue in the manual providing there is no hidden requirement. For the record, we will likely address this issue by local ordinance in the near future.
2. Both Chapters 7 and 8 are bulky. This appears to be typical Western Washington document. See what can be done to keep to the point.
3. 7.2.2 Critical Areas - add something to the effect that "the local jurisdiction may have the critical areas largely established by local ordinance and the drawing should reflect those in addition to features identified by site inspection"

40 WSDOT:

1. Page 7-1: General comment. WSDOT has extensive experience in construct stormwater pollution prevention and have developed a training and certification program for WSDOT staff and contractors for construction projects. This program is also used and administered by the Associated General Contractors (AGC).
2. Page 7-10: First paragraph. Indicates that construction SWPPPs must be reviewed by the local permitting authority. WSDOT, as the local permitting agency on our projects, should not be required to submit WSDOT construction contract SWPPPs to the local agencies for review. If they request them we will provide them a copy. WSDOT has extensive experience in construction activities and as the developer and author of the certification program.

3. Page 7-14: Critical Areas. Temporary, fabric, and high visibility construction fencing in place of chain link fencing should be included as options to assure that equipment operators and others to stay out of critical areas.
4. Page 7-22: BMP inspections. It should be made clear that daily inspections of sediment control BMPs during the wet season are not necessary if the contract has gone into winter shutdown and no activity is taking place.
5. Page 7-35: BMP C105. Make the use of Geotextile optional and allow use of other types of crushed rock such as Base Course.
6. Page 7-102: BMP C230. Bullet four basically eliminates use of straw bale weirs in streams, channels and ditches. The WSDOT has experience using fabric wrapped straw bale weirs as temporary short-term dams in streams during low flows to contain, trap, and prevent sediment and turbid waters from leaving in-water work areas. These applications are limited and care has to be performed when installing them, but they can work if done correctly.

Chapter 8 Source Control

30 Yakima Co:

1. BMPs for de-icing:
 - a) Define “least environmental impact”
 - b) Should an impervious pad be required if there is no history of spillage and/or the material has little or no environmental impact?
 - c) Say “as soon as practicable” rather than “as soon as possible”
2. BMPs for dust control
 - a) It is almost impossible to water a road without creating some runoff
 - b) Why is there a recommended BMP for paved roads here?
3. BMPs for roadside ditch maintenance
 - c) Shouldn’t encourage vegetation growth in ditches
 - d) Why discuss handling of non-contaminated cleanings?
 - e) Manual should not dictate culvert maintenance priorities
4. BMPs for maintaining drainage and treatment system
 - f) Any evidence that warning signs are effective? Resources could be used elsewhere
5. BMPs for urban streets
 - g) Editorial comments should be removed. Format inconsistent with other sections

31 Fairchild AFB:

1. The first applicable BMP for aircraft deicer (Page 8-15) mentions the conveyance of spent aircraft deicer to the sanitary sewer. This contradicts the current policy of Ecology’s ERO: AKART analysis of this process wastewater stream is required before a disposal option is selected; and sanitary sewer discharge to the Spokane Regional Wastewater Treatment Facility is not a desirable alternative due to the high BOD of the glycol component.
2. The second applicable BMP for aircraft deicer (Page 8-15) prohibits the discharge of spent deicer from application areas. Although airports are not allowed to discharge deicer under dry weather conditions according to NPDES stormwater discharge permits, there is not currently any prohibition against deicer contaminated runoff leaving application areas during precipitation events and snowmelt conditions. Collection and

disposal of this dilute material during “wet weather” events can be next to impossible unless infrastructure is in place to capture what can be “excessive flows” under these conditions.

3. The pollutant control approach outlined under the BMPs for washing vehicles and equipment mentions “washwater may be discharged to the ground after proper treatment in accordance with Ecology guidance document WQ-95-056.” The preceding paragraph in the narrative includes charity car washes in this category. Although all of the Fairchild AFB wash racks discharge to the sanitary sewer system after passing through pretreatment equipment, these wash racks are not convenient for use by organizations conducting “charity car washes”. The base has limited (in writing from the Base Commander) the charity car wash function to be conducted at one designated location. This location was selected based upon availability to the general base populace and the possibility of isolating the runoff from the stormwater collection system. Runoff from the selected location is allowed to flow along an asphalt parking area at the elementary school and overflow, if necessary, to the adjacent grass area. There is not any form of treatment available. Will this practice be acceptable or will this be in violation of the new requirement? We feel that the base is using best management practice by limiting the charity car wash to only one area and the small amount of water discharged gets some degree of treatment in the adjacent grass/soil area.

33 Spokane Co:

1. General Comments: An Industrial Stormwater General Permit “requires (the) description and implementation of operation source control BMPs.” Further, the Eastern Washington Stormwater Management Manual is the applicable reference for the selection of BMPs necessary to obtain this General Permit. Almost all of the Source Control BMPs found in Chapter 8 are BMPs that are more appropriately linked to the Industrial Stormwater General Permit, and less likely to be feasible on a common commercial, residential or public project in eastern Washington.
2. There should not be any BMP having post-construction requirements/recommendations because they are cannot be enforced feasibly by the local jurisdiction. Almost of the BMPs are post-construction related and it appears that the local jurisdiction would have to monitor and enforce these BMPs at significant cost impact. If the post-construction requirements are needed for approval of an Industrial Stormwater General Permit, then Ecology should monitor and enforce the use of the specific BMPs. For example: BMPs for Commercial Animal Handling Areas: regularly sweeping and cleaning animal keeping areas, collect and properly dispose of droppings, uneaten food, avoidance of hosing down areas that could flow to receiving waters. These are BMPs that must be monitored throughout the operation of such a facility. Many source control BMPs would add maintenance responsibilities to local jurisdictions (such as sprinkling unpaved roads and specific maintenance procedures) that will cause significant cause impacts. These requirements go far beyond the scope of “source control” during construction of a stormwater management facility.
3. The BMPs should be separated into two sections that delineate those that are necessary for obtaining an Industrial Stormwater General Permit, and those that can be implemented on a local level. We recommend that the BMPs listed in chapter 8 that are not specifically related to new development and redevelopment be removed and put in a separate document related to municipal/industrial/commercial NPDES permits. Another

suggestion would be to reword each of the BMPs listed in chapter 8 such that they relate to the design and construction of a project during the development or redevelopment of a particular facility.

4. Use the same permit name every time the permit is mentioned; there are several variations in this chapter of the same two permits.
5. Section 8.1.2 Content and Organization of this Chapter: First paragraph, Page 8-2: The following sentence is not necessary: “This chapter should be consulted to select specific BMPs for source control for inclusion in Stormwater Site Plans (see Chapter 3). Either you would be in Chapter 3, reading about utilizing Chapter 8 for source control BMPs or you would already be reading Chapter 8, and thus do not need to be reminded to consult this chapter for satisfying a requirement of Chapter 3.
6. Section 8.1.4 Treatment BMPs for Specific Pollutant Sources: This section talks about how “treatment BMPs may be required by Ecology or local governments if a significant amount of pollutant remains in the stormwater discharge after the application of...BMPs...” This implies that monitoring, after implementation of source controls, is required since there is no other way to determine whether or not a “significant amount of pollutant remains...” The fact that Page 1-13 makes a statement that claims that a combination of treatment and source control will always be required, makes Section 8.1.4 unnecessary. The issue of why treatment is necessary and why source control is necessary and how they can work in tandem has been covered repeatedly in other areas of the Manual; it is not needed here also.
7. Section 8.1.5.1 Applicable BMPs, Page 8-3: First paragraph: Which BMPs are applicable for redevelopment and for new development? Local governments can only enforce construction BMPs for new development. Local governments cannot enforce post-construction BMPs on new construction or re-development. This is done by Ecology with the Industrial Stormwater General Permit.
8. Section 8.2, Page 8-4: Change this heading to “Selection of Operational and Structural Source Control BMPs Applicable to Industrial Stormwater General Permit.”
9. Section 8.2.2 Pollutant Source-Specific BMPs:
 - a. Page 8-16, BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots: It was previously agreed upon at a Manual Subcommittee meeting that the first bullet under Applicable Operational BMPs would be deleted. This is an air quality control problem prior to it becoming a stormwater pollution issue. In addition, it isn’t practical to expect any municipality to control dust to this extent.
 - b. Page 8-31, BMPs for Log Sorting and Handling: Revise the bold heading near the bottom of the page to “Ecology’s Industrial Stormwater General Permit Requirements:”
 - c. Page 8-33, BMPs for Maintenance of Public and Private Utility Corridors and Facilities and Page 8-35, BMPs for Maintenance of Roadside Ditches: Maintenance of roadside ditches will always occur post-construction, thus it cannot be expected that on a project by project basis that BMPs such as this will be incorporated into a source control plan.
 - d. Page 8-36, BMPs for Maintenance of Stormwater Drainage and Treatment Facilities: All of the necessary maintenance for every aspect of a stormwater management facility is covered in Chapters 5, 6 and 7. It would be confusing to

- the reader if he thinks that this is where the maintenance criteria are found. This BMP should be deleted.
- e. Page 8-42, BMPs for Parking and Storage of Vehicles and Equipment: The stormwater treatment criteria that covers these land uses are found in Chapter 5 and does not need to be re-emphasized here. This BMP should be deleted.
 - f. Page 8-44, BMPs for Roof/Building Drains: The stormwater treatment criteria that covers these land uses are found in Chapter 5 and does not need to be re-emphasized here. This BMP should be deleted.
 - g. Page 8-44, BMPs for Soil Erosion and Sediment Control at Industrial Sites: All of Chapter 7 is devoted to Erosion and Sediment Control and has little or no impact when just briefly mentioned here. This BMP should be deleted.
 - h. Page 8-52, BMPs for Urban Streets: The stormwater treatment criteria that covers this land use are found in Chapter 5 and does not need to be re-emphasized here.
10. Section 8.2.2 Pollutant Source-Specific BMPs: After reading all of the BMPs in this chapter, we recommend that the BMPs be divided into two sections. The first section would be for BMPs that can only be implemented with an approved Department of Ecology Industrial Stormwater General Permit. The second section would be the BMPs that can be implemented with a building permit application. The following elements of each BMP might be applicable and practical to implement by the local agency with a building permit.
- a. BMPs for Fueling at Dedicated Stations:
 - i. Construct fueling station on an impervious concrete pad under a roof or canopy to prevent the direct entry of precipitation onto the spill containment pad. The roof or canopy must cover, at a minimum, the spill containment pad, but should extend several additional feet to reduce the introduction of windblown rain;
 - ii. Convey all roof drains to storm drains outside the fueling containment area;
 - iii. A treatment BMP must be used for contaminated stormwater and wastewater in the fueling containment area;
 - iv. Slope the concrete containment pad around the fueling island toward drains; either trench drains, catch basins and/or a dead end sump;
 - v. The slope of the drains shall not be less than 1 percent;
 - vi. Drains to treatment shall have shutoff valve;
 - vii. Stormwater collected on the spill containment pad shall be conveyed to a sanitary sewer system (if approved by the sanitary sewer authority) or to an approved treatment system such as an oil/water separator and a water quality treatment BMP;
 - viii. Design the fueling island as a spill containment pad with a sill or berm raised to a minimum of four inches to prevent the runoff of spilled liquids and to prevent run-on of stormwater from the surrounding area;
 - ix. The fueling pad must be paved with Portland cement concrete, or equivalent. Asphalt is not considered an equivalent material.
 - x. If the vehicles that will utilize the fueling station are 10 ft in height or greater, then a roof or canopy may not be practical. In this situation, the fueling station must be equipped emergency spill control.
 - b. BMPs for Landscaping and Lawn/Vegetation Management:
 - i. Specify engineered soil for landscaped areas to improve infiltration;
 - ii. Use at least a 6 inch (Chapter 6 says 6 inch, Chapter 8 says 8 inch; this discrepancy needs to be resolved) topsoil layer with 1% organic matter (Chapter

- 6 says minimum of 1%, Chapter 8 says 8%; this discrepancy needs to be resolved) needs to be utilized in landscape areas.
- iii. When this topsoil mix requirement is required needs to be clarified. There is no way to implement and/or enforce this in a residential development as lawn and landscaping does not occur until the individual lot is sold. Furthermore, does not occur until the home is completely built, which may happen over the course of several years.
- iv. Select an appropriate turfgrass mixture based upon the suggested seed mixes indicated in Chapter 7 and based upon the regional climate.
- c. BMPs for Loading and Unloading Areas for Liquid or Solid Material:
 - i. Install overhangs or door skirts that enclose the expected trailer end to prevent contact with rainwater;
 - ii. Design the loading/unloading area with berms, sloping, etc. to prevent the run-on of stormwater;
 - iii. Pave the area on which the transfer takes place. If the transfer involves a liquid which could be reactive with asphalt, the area must be paved with Portland concrete cement;
 - iv. Slope, berm or dike the transfer area to a dead-end sump, spill containment sump, a spill control oil/water separator, or other spill control device;
 - v. The minimum spill retention time should be the peak flow rate of the 6 month, 24 hour storm event over the surface containment pad;
 - vi. The volume of the spill containment sump should be a minimum of 50 gallons with an adequate grit sedimentation volume.

36 ACEC Spokane:

1. Page 8-3, 3rd paragraph: why are “industrial stormwater general permit” standards being applied to other than industrial discharges?
2. Page 8-5 section 8.2.1, 3rd bullet: the reference to the SWMMWW should be deleted, and the appropriate information included in this manual
3. Page 8-5 section 8.2.1, 4th/5th bullets: need to define “promptly”
4. Page 8-6, section 8.2.1.1, 3rd bullet; clarify reference to discharge to sanitary sewer. Most municipalities would require this sort of discharge to undergo pre-treatment
5. Page 8-8, section 8.2.1.5: what is the statutory source for a 3-year records retention?
6. Page 8-9, section 8.2.2: why does this manual double up on other permits? This manual should only address those activities that are not otherwise addressed by other permits. If boatyards are covered either under the “boatyard activities” or “industrial activities” permits, they don’t need to be included here. Conversely, this manual addresses commercial animal handling areas, but not feedlots.
7. Page 8-12, commercial composting, 1st bullet: the composting facility has not control over what fertilizers, etc. are applied by homeowners, business owners and other who generate the feedstock. Is the intent of this to require testing for each and every load brought in?
8. page 8-17, 5th bullet: is there any land subject to ORV use that is not “dust-generating”??
9. 6th bullet (paving trafficked areas) would result in an increase in runoff, which seems at odds with the intent of the manual.
10. 7th bullet (chemicals) leads to other problems as noted the 1st 3 bullets of this section
11. Page 8-18: why doesn’t “fueling stations” include areas where bulk fuels are transferred?
12. Page 8-21, “illicit connections”: just when are these implemented? the connections may have been allowable at the time the building permit was issued.

13. Page 8-22: “landscaping” would appear to apply to single-family residences. Just how does ECOLOGY intend to require a single homeowner to develop and implement an IPM, particularly those in low-income areas?
14. What about domestic animal wastes? How can a homeowner control the neighbor who allows their animal to defecate on the homeowner’s property (particularly if the homeowner is absent/not attentive? What about stray animals?
15. The manual should be revised and limited to what is practical, and what will provide a “pretty good” result, rather than a “perfect” result.
16. Page 8-52, “urban streets”: how is an “efficient vacuum sweeper” defined? Will Ecology provide the funding for municipalities to upgrade/acquire the required equipment? How about funding for studies to determine optimal sweeping frequencies, and then to sweep at the “optimal” frequencies? If not, then don’t impose an unfunded mandate!

37 Ecology:

1. Specific comments regarding the use of salt for de-icing roads, parking areas, sidewalks and other surfaces:
 - a. Sidewalks may be pollutant-generating if they are commonly salted or sanded to prevent formation of ice on the surfaces. This should be addressed in the stormwater site plan and appropriately considered in sizing treatment facilities.
 - b. Salt loading to wetlands from road de-icing may impact biologic functions. This potential problem should be discussed and addressed in both Core Element #4 Protection of Natural Drainages and Core Element #5 Runoff Treatment, as well as in source control and runoff BMPs for roads, sidewalks and parking areas subject to the use of salt.
 - c. BMPs for the use and storage of salt should be included in the Manual.

38 Ten Cities:

1. p. 8-1 and section 8.1.5.2: Kennedy/Jenks is reviewing BMPs in use at the City of Pasco and will recommend emerging BMPs to Ecology at a later date.
2. p. 8-7 There is no mention of Spill Prevention and Control (SPCC for short) that some industrial companies and those with above ground storage tanks, etc. have to complete in Washington. Some of the information and BMPs in SPCC plans are very similar to storm water BMPs, and complementary. Some of the source control BMPs are similar to the SPCC measures. Therefore, cities that have SPCCs should coordinate the SPCC and stormwater spill control efforts.
3. p. 8-24 3rd bullet from last "Do not spray pesticides within 100 feet ..." - How might this effect the maintenance of irrigation canals in cities? Irrigation Districts typically use pesticides to limit plant growth to maintain flows in their system of canals. Irrigation Districts have Ecology issued permits for use of pesticides in their canal systems.

39 City of Spokane:

1. Both Chapters 7 and 8 are bulky. This appears to be typical Western Washington document. See what can be done to keep to the point.
2. Go through and remove language specific to Western Washington such as Acute and Chronic Saltwater in the table on page 8-59.
3. 8.2.1.2 add sentence pointing out that we must legally dispose of cleanup material (Rags used for cleanup shall be purple and gold. These soiled rags shall be sent back to the U of W for processing.)

4. 8.2.2 page 46 - consider requiring 110% for temp. storage as required under Applicable Structural Source Control BMP's on page 49.

40 WSDOT:

1. Page 8-1. General comment. Suggest changing the order/organization of this chapter. Move Section 8-3, Stormwater Pollutants and Their Impact ahead of Section 8.2, BMPs. Section 8.3 would become Section 8.2 and vice versa. The reason for this order change is that the info on pollutants would be presented to the user first. Then solutions to the impacts via the BMPs would follow.
2. Page 8-1: Feedback Requested 8-1. References to Puget Sound, salt water, tide flats, shellfish, etc. should be removed or edited to include eastern Washington information.
3. The first and recommended source control BMP should be to use sheet flow, infiltration by natural dispersion as the first and primary treatment of runoff. Collecting and concentrating of stormwater should be discouraged because treatment has to be utilized.
4. Page 8-4: Section 8.1.5.2, Recommended BMPs. WSDOT agrees that this manual and BMPs are recommendations and not requirements or regulations. It is in the best interest of the user to consider source control first before having to provide treatment options. There are numerous sections where must or other forceful connotations are used, would suggest that a softer tone be used like should, recommend, etc.
5. Page 8-23: Pesticides. Pesticide applications should be made by applicator that has gone through the proper training and testing and are qualified or certified for applying pesticides and herbicides. This is especially important near water sources.
6. Page 8-35: 2nd to last paragraph. This indicates that roadside ditch cleanings may be screened to remove litter and vegetative matter. This is not the normal practice for current public agencies. This would be too labor intensive and materials may be in large quantities for long linear roadways. Normally this material is transported to identified upland sites for backfill that have limited potential for release to or effect on water resources.

Bibliography

37 Ecology:

1. Bibliography is missing from the printed document. Please include it in next version.

UIC comments

Note: these comments will be addressed by the UIC rule revision advisory committee

33 Spokane Co:

1. Note that as a technical guidance manual, this manual alone has no authority to prohibit uses; the prohibition of uses will need to be included in the UIC rule requirements.
2. Section 2.1 Introduction, 1st paragraph: The second sentence of states that the core elements are applicable to discharges to surface waters and (the draft manual says "or") to UIC rule-authorized subsurface infiltration systems. Recommend this be noted in the title for Table 2.A and then remove footnotes 1 & 2 at the bottom of the page since these are redundant.
3. If Table 2.A is intended specifically for UIC regulation, then the header should state that. If not, this table's application to discharge to waters of the State should be clearly stated.
4. Tables 6.6.1 – 6.6.4: These tables contain a matrix for determining groundwater susceptibility and drywell suitability under different geologic conditions. Data collected

on the Spokane aquifer indicates that susceptibility is much higher than would be indicated by applying these tables. See the attached detailed memo from Stan Miller for a complete discussion of this issue.

5. Table 6.6.4: According to the text on Page 6-42 (see first bullet), a site with moderate pollutant loading over an aquifer with very low susceptibility can discharge directly to subsurface if “source control eliminates or significantly reduces target pollutants.” The box reflecting these two site conditions needs to be changed to read ‘Direct Discharge following Source Control or Discharge following treatment.’
6. For Heavy Pollutant Loadings, How can the answer under High Susceptibility be “No Discharge,” and “Discharge following treatment and source control,” at the same time? The box should be reworded to state “Typically, no discharge allowed. Discharge following treatment and source control only allowed when ____.” Provide the criteria for when it is acceptable.
7. It is not obvious that the Footnotes and Notes for table are on the following page. Since the next set of information (“The following text can be used in conjunction with Table 6.6.4”) is also tied to the table, this information should be placed under a sub-heading called, “Information to be used in conjunction with Table 6.6.4.”
8. Page 6-41: Sub-heading: “Direct discharge to subsurface infiltration systems without treatment:” Delete this sentence from the first paragraph: “This includes discharges from non-pollutant generating surfaces such as landscaping and vegetated areas that have not been treated with pesticides or fertilizers, non-contaminant generating roofs, bicycle paths, etc.” To leave this in implies that a fertilized lawn is an area that must be considered for treatment. The first sentence above the first set of bullets seems to be a bulleted item that was mistakenly typed as a sentence; this matches what is shown in the table. Revise as a bullet.
9. Page 6-42, Sub-heading: “Discharge to subsurface infiltration systems following the use of treatment BMPs:” The entire Section 6.6 should italicize the loadings in order to help the reader follow along.
10. Page 6-43, The section that begins, “The following uses of subsurface infiltration systems may not be allowed due to potential contamination...”
 - a) The “Introduction” indicates that this manual has no independent authority and is only technical guidance. Therefore, this manual alone cannot prohibit uses. This prohibition would need to be contained in the new UIC rule and would likely only give Ecology the authority to prohibit specific land uses.
 - b) Local governments do not have the authority to prohibit uses. Local governments also do not have the authority to require or review management plans for storage and spill prevention.
 - c) This section should be revised to discuss what law prohibits the uses of concern and what agency will regulate this prohibition.
 - d) The “activities” that have a “high risk of runoff becoming contaminated,” and have the potential to be prohibited, need to be listed.
 - e) Table 6.6.4 does not indicate that sites with Moderate Susceptibility and accept runoff from Commercial or Industrial sites or High ADT Roads “may not” be allowed to utilize subsurface infiltrative systems. Revise text to match table.

34 USPS:

1. The USPS understands that the Manual is not a regulation nor does it have independent regulatory authority. However, regulations can cite this Manual and its BMPs, Core Elements, etc. as the means to compliance. It is expected that the UIC Rule Revision will cite relevant portions of the Manual as the means to compliance or criteria for rule

authorization of Class V wells. It is thus difficult to provide specific comments with respect to portions of the Manual that may or may not “in essence” become regulation via references in the still undefined UIC Rule Revision. The USPS believes this uncertainty also complicates the Manual’s goal of supporting sound public health and environmental policy related to stormwater.

2. Concern is avoiding Manual-created impacts to existing infiltration and injection systems
3. Manual should encourage activities that support infiltration options and encourage the development of new storm water management practices.
4. The Manual should not limit options of continued injection but instead rely on the ongoing revision to UICP rules and its definition of Authorized by Rule (with that definition’s inherent impacts to non-endangerment).
5. The Manual authors should distribute and incorporate results of pilot studies attempting to demonstrate the sufficiency of natural available attenuation (treatment) of dry wells. (Spokane City study of dry wells.)
6. Will the Manual be subject to revisions once the final UIC Rule revisions are cast?
7. Has the state completed a classification of Aquifer Susceptibility? If so where can it be viewed?
8. Have pollutant levels been identified that confirm attainment of the Nonendangerment performance standard? If so where can they be found?
9. Please clarify the language surrounding retrofitting and redevelopment activities associated with sites containing existing dry wells. If retrofitting of existing dry wells to Manual described BMPs is to be required via the UIC Rule Revision, then we recommend that a “grandfathering” option be available for existing drywells to reduce the economic and operational burden on regulated entities.

39 Ten Cities

1. Will the Manual be changed to reflect the actual revisions to the UIC Rule? Since the UIC Rule revision will be finalized after the Stormwater Management Manual is adopted, the Manual should refer to future UIC changes or be revised after the UIC Rule Making is complete.
2. The general requirement for treatment of stormwater discharging to drywells that are 1) located above an aquifer of “moderate or high susceptibility” and the discharge is from any “pollutant loading source area” or 2) located above an aquifer with “low susceptibility” and the discharge is from a “moderate or heavy pollutant-loading source area.” Such general requirements are overly conservative and do not consider many factors that influence aquifer susceptibility. For example, the type of pollutant is a very important factor and most urban runoff contaminants are not particularly mobile in the soil or groundwater environment. Contaminant solubility and soil chemistry also will influence potential risks to receptors. At a minimum, there should be an alternative that allows for impacted entities to demonstrate that impacts will be insignificant without treatment on a case-by-case basis.
3. There are no definitions on what is low, moderate and high regarding pollutant source area. These must be defined to assess impacts.
4. p. 5-33 Many drywells extend below the ground surface into native geologic materials, including indurated deposits. Table should also incorporate compatible geologic materials terminology

5. p. 6-39 Table 6.6.1 to 6.6.4. These need to be consistent with UIC rule changes and should include precipitation in some way. UIC advisory group is currently looking at redoing these tables. This revisions, once done, need to be incorporated into manual.
6. Table 6.6.1 isn't clear in the use of the geologic matrix. Does one pick the shallowest geologic materials or those with the lowest unsaturated hydraulic conductivity? The Manual should clarify this, possibly incorporating vadose zone concepts with respect to unsaturated moisture movement.
7. Table 6.6.4: Are the surfaces used in the table comprehensive enough? When an aquifer has a very low susceptibility to contamination from runoff, the need to treat runoff should be tied to other issues, not the aquifer. The range of surfaces needs to be matched to their significance in arid and semi-arid climates and other human activities. Also, in those circumstances where a very low susceptibility aquifer is present runoff treatment (if any) should be evaluated against other conditions, not impacts to the aquifer.

39 City of Spokane:

1. We have concerns that until regulation has been written to address UIC, our comments concerning those parts of this document may not be complete. We are getting mixed signals locally from Ecology on the future validity of drywells and whether or not they will be rule authorized. City involvement in the regulatory process for UIC is a must.

Editorial Comments

1. The type of draft watermark that was used made the documents very difficult to upload and print. Ecology received numerous complaints regarding this issue. A different type of watermark should be used in the next electronic version; it should also be tested prior to mass production for ease of uploading and printing.
2. We assume spelling, grammatical and format issues in the document will be corrected in the final version.
3. Consistent terminology and definitions: “drainage manual administrator” “local permitting authority”
4. Where did we get the numbering system for the BMP's?
5. All mentions of forested conditions should be changed to something like “native vegetation”.
6. Textual references in the body of the Manual that discuss Maintenance should be cross-referenced with the appropriate Appendix to ensure that the same information is included in both places; several important Maintenance criteria that were found in the text were not mentioned in the Appendices.
7. Many chapters have repeated and overlapping information which conflicts (i.e. See Chapter 6).
8. Since websites and addresses (including the location of information within sites) change so frequently, it may be better to refer to the overall site (home page) and tell the reader to look for a specific topic.
9. Use the same permit name every time a permit is mentioned.
10. Page FOR-3: Add to Gary Beeman's information: “WSDOT -- South Central Region Environmental Program”.
11. p. 1-7 paragraph 1 line 5 “range” is misspelled
12. In earlier draft versions of Chapter 2, subsections for “applicability to drywells” and other similar special use considerations were underlined for highlighting. This formatting was

lost prior to printing, but some way of highlighting these sections would be helpful to future users of the Manual.

13. It may be helpful to users of the Manual for the chapter titles to more closely reflect the Core Elements. Specifically, the titles of Chapters 3, 7, and 8 already accomplish this, but Chapter 5 might be re-titled “Flow Control Facility Design” or “Design of Flow Control Facilities” and Chapter 6 “Runoff Treatment Facility Design” or “Design of Runoff Treatment Facilities.”
14. Chapter order and names should reflect the “Core Elements”. Example: Chapter 5 should be renamed “Flow Control” and renumbered as Chapter 6 since the Core Element “Runoff Treatment” comes before “Flow Control”.
15. Several sections and subsection in the manual contain numerous paragraphs. Some paragraphs begin with a title such as in Section 2.2.5, page 2-19, “Treatment Facility Sizing.” For better readability and quicker reference suggest using more of these titles when there are several paragraphs in a subsection that deal with different topics. Also suggest using a bold typeface for the paragraph titles.
16. Page 2-6, the four bullets under ‘Guidelines’ should be numbered 1 through 4 to match the text in first paragraph.
17. Section 2.2 Core Elements, Page 2-10 :Underline or italicize ‘Applicability to drywells’ as it was previously; as-is, it does not stand out.
18. 2.2.4 bold Applicability to Wetlands
19. Page 2-20, Water quality design volume – should be bold like Water quality design flow rate on Page 2-21.
20. Figure 2-B bigger. Add county lines?
21. Figure 2.B (p. 2-22) should include a reference to the full-color figure that will be included in Chapter 4 (Figure 4-3.1). A list of the climatic regions by city or population center might be helpful in this section.
22. 2.2.5 Objective - The statement "a conservative approach is suggested" is not necessary. Just prescribe the standard.
23. 2.2.5 top of page and pages 2-20 and 2-21 - "water quality design volume" and "water quality design flow rate" should be formatted the same.
24. All specific references to the “long duration storm,” “regional winter storm,” and “72-hr storm,” need to be revised to one common term.
25. Figure 4.3.1 shading not usable
26. Figure 4.3.2 through 7 numbers difficult to read
27. Chapter 5 might be better titled "Flow Control - Detention, Retention and Infiltration"
28. Should runoff quality be addressed before runoff quantity (Ch 5)? Whether or not runoff is polluted needs to be considered before structures are designed for retention, disposal, infiltration, etc. This conceptual approach would seem to be more in line with how a manual user would design a system. We suggest that Chapters 5 and 6 be reordered.
29. In the third column on p. 5-55 in the rodent section, *pone* should read *pond*.
30. p. 6-57 second paragraph of intent: “intent of sloping the bottom is to...”
31. p. 6-83 after Amended Sand Filter replace Section 6.8 with 6.12
32. Chapter 6 might be better titled: "Runoff Treatment - Water Quality Facility Design"
33. 6.7.6 Vault Structure - items under Vault Structure should be bulleted.
34. Figure 6.2.1 and 6.2.2 - Enlarge the titles. Also, make these appear similar to Figure 2.A, standard flow chart format.

35. Figure 6.2.3 - Either remove this map or enlarge to cover Washington State and/or the general vicinity of our region.
36. Table 6.2.1 – re-title to Pollutant Sources
37. Page 6-35, Step 3, 2nd to last sentence: “Read the filter trip...” should be strip.
38. Page 6-99, Defect- Piping: “Recommend a Goethechnical...” should be geotechnical.
39. p. 7-79 extra label should be erased at top of page
40. Fourth paragraph in this section, Page 8-3: Change the reference to Ecology’s 1995 industrial stormwater general permit to the date on which it was most recently revised: August 2002; capitalize Industrial Stormwater General Permit.
41. Section 8.1.5.1 Applicable BMPs, Page 8-3: subsection numerical headings were limited to three places by vote at the Manual Subcommittee.
42. Section 8.1.5.1 Applicable BMPs, Page 8-3: First sentence: Spell out the full name of each NPDES Permit to which this section refers.
43. Section 8.2, Page 8-4: Third paragraph: Insert the word “Industrial” between “Ecology’s” and “Stormwater.”
44. Section 8.2.1 Applicable Operational Source Control BMPs, Page 8-5: First paragraph: Insert the word “Stormwater” between “Industrial” and “General Permit.”
45. p. 8-30 erase extra label